TECHNOLOGY DEPT.

Coal Age

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JUNE, 1945

TO THE AMERICAN PEOPLE:

Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.

We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.

Give us not only the needed implements of war but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.

William D. Leahy
Douglas MacArthur
E. J. King
Dwight D. Eisenhower
C. W. Nimitz
H. H. Arnold

BUY A BOND TODAY

Associated Press, Inc.

PROPER LUBRICATION SAVES

$1664 A YEAR

SUN MINE LUBRICANTS...

Increase Output of Coal-Loader, Reduce Shutdowns

In the heart of the western Pennsylvania coal fields, an operator was having trouble with the lubrication of a "loader." The machine was loading 5' vein coal and operated under extremely wet conditions most of the time. The impurities in the water reacted with the grease, causing it to gum up. The transmission and gathering heads had to be cleaned every two or three days.

Excessive time out reduced the loader's output, until finally the management asked a Sun engineer to help. He analyzed the mine water and other operating conditions after which he recommended a Sun grease. The new grease resisted the impurities and the washing action of the water. The loader now runs two or three weeks between cleanings.

Estimated savings have been $1664 a year for labor alone. In addition, there has been an increase in production and a decrease in amount of grease used. Greases are only one of the quality petroleum products, prepared by Sun for coal-mine equipment. For every application, from vein to tipple, and right on to the consumer, Sun makes a complete line of greases, oils, and coal sprays. Sun petroleum products are designed for every type of power equipment, compressor, hoist, conveyor, or other mine machine. Call in the Sun engineer for expert help.

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

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First step in a loaf of bread

A typical example of B. F. Goodrich development in rubber

WHEN a grain elevator breaks down, some miller doesn't get grain and a lot of people don't get bread. And the elevator where this picture was taken was breaking down — often.

They used a chain to run the big belt that carries grain. At the high top of the elevator, it was a nuisance to grease so it didn't get greased — and breakdowns were frequent.

The chain and gears finally went to pieces for keeps, and the owner decided to replace them with a rubber V-belt drive that wouldn't need any lubrication. The only trouble was he was told there wasn't room enough unless he wanted to tear out part of a concrete wall and floor to make room.

But instead of doing that he called for help from B.F.Goodrich. He learned that B.F.Goodrich engineers had, just a short time before, developed an entirely new kind of V-belt—more than twice as strong as any other belt because it had two wire cables, called grommets, buried in the rubber of each belt to give it strength, absorb shock and make sure of positive drive at any speed.

B. F. Goodrich engineers studied the problem, then recommended and installed a drive using these new wire grommet V belts. Because of their strength only a few were needed; there was plenty of room for them. Because they require almost no attention, maintenance costs have just about been eliminated, and the grain keeps moving. In addition they're clean and quiet — no grease or dirt, no clanking. All these are typical results of the B. F. Goodrich research that has meant so many important improvements in rubber products for industry. *The B.F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

to do one thing and do it

It was a supreme achievement when Anthony Nicholls, of Philadelphia, built the first American fire engine in 1733, giving the public an instrument designed to save lives and property.

It was also a supreme achievement when Hulburt of Philadelphia, in 1920, offered coal mines a GREASE with QUALITY . . . made solely to lubricate and save coal mine equipment!

HULBURT OIL & GREASE COMPANY . . PHILADELPHIA, PENNA.

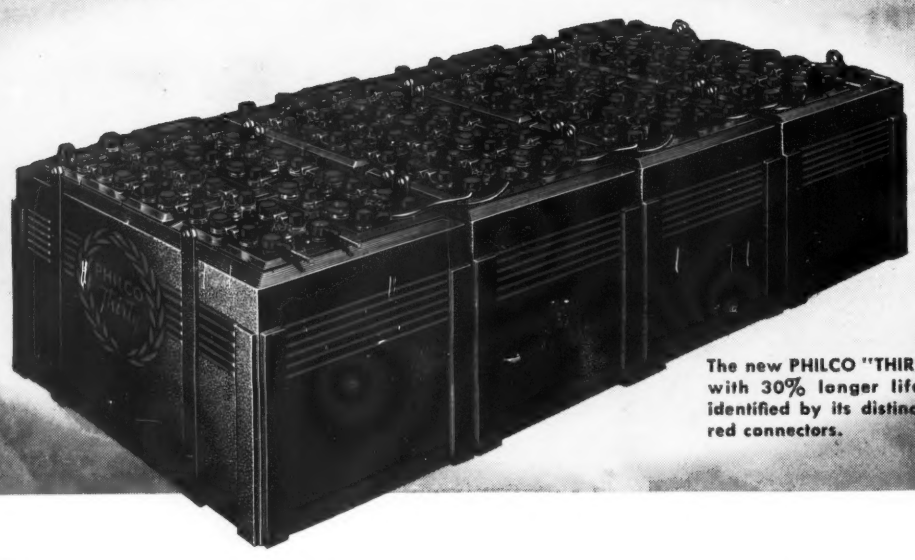
Specialists in Coal Mine Lubrication

SUPREMELY WELL

HULBURT *Quality* GREASE

FOR THE LATEST IN
MODERN MINE BATTERY DESIGN...

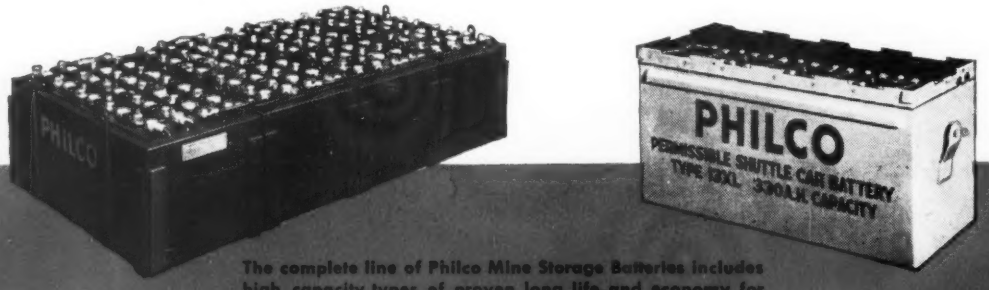
Specify PHILCO



The new PHILCO "THIRTY" with 30% longer life is identified by its distinctive red connectors.

MORE THAN EVER, today, Philco stands out as the leader in the development of modern high capacity, long-life storage batteries for mine haulage. Well known to mine operators is the pioneering work of Philco with its famous extra capacity XL and XVL type Batteries. And now, in addition, the great new Philco "Thirty" with 30% longer life, is available in increasing quantities for current deliveries. Powered by modern Philco Batteries, your locomotives and shuttle cars haul more tons. Philco dependability and longer life save you money. Write today for new descriptive catalogs. PHILCO CORPORATION, *Storage Battery Division,* Trenton 7, New Jersey.

For 50 years a Leader in Industrial Storage Battery Development



The complete line of Philco Mine Storage Batteries includes high capacity types of proven long life and economy for all battery-powered locomotive and shuttle car equipment.

Coal Age

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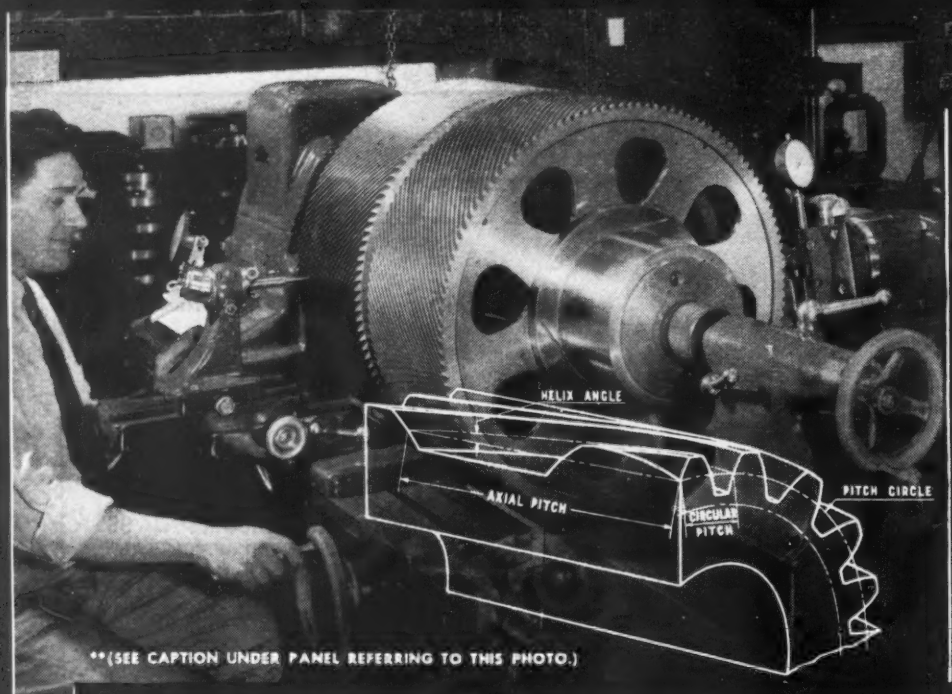


**(SEE CAPTION UNDER PANEL REFERRING TO THIS PHOTO.)

Studious Inquiry

at Falk Antedated "Modern Research" by Over 40 Years!

When plastics from resins and magnesium from sea water were only a gleam in the eye of scientists, Falk research was "a going concern."

It was started forty-nine years ago!

Today, more than ever before, Falk is involved in probing structural mysteries through metallurgy and chemical analysis; in tearing apart the "fibers" of metals by mechanical testing; and in delving into the technologies of mechanical power transmission.

All of this studious inquiry was established Falk practice before the phrase "Modern Research" was born!

It is understandable why Falk is a good name in industry.

For by this studious inquiry, Falk has contributed much to the art of its own industry, just as it has to its customers, its community, and its employes, by the maintenance of and adherence to a basically sound, intelligent, and equitable business policy.

It always pays to consult Falk!

* FALK CONTRIBUTIONS

1896... The first Falk research was initiated 49 years ago in a Chemical Laboratory devoted to the testing of "ingredients of materials" used in the manufacture of Falk products.

1900... Metallurgical research was made a part of the Chemical Laboratory so that "Falk's foundry work included not only its art but also its science."

1905... An old Falk catalog refers to Falk research and describes "our own Chemical and Testing Laboratories which enable us to secure a complete record—microscopic, physical, and chemical—of all material used in our furnaces and of the resultant castings."

1906... Harold S. Falk, now President, graduated from the University of Wisconsin, the first student of that school to major in metallurgy, stimulating further interest in the importance of research in the field of metal-working.

1910... Falk designed and built its own gear hobbing machine in order to manufacture an improved type of herringbone gear which Falk research had proved feasible.

1927... An extensive research program of gear performance and capacities was inaugurated. The findings, later presented in an engineering paper, were subsequently found to possess widespread significance.

1929... The first research program on the Falk All-Steel Flexible Coupling was started, resulting in improved performance and longer life.

1934... The research on gear performance and capacities, started in 1927, was brought to a conclusion and culminated in the Schmitter Rational Gear Formula, now accepted by the industry as the basis for gear design and rating.

1935... Further research on Falk Couplings resulted in a coupling that is unique both from the design and long, trouble-free service standpoint.

1938... Research was carried on which led to the famous Falk Marine Reverse Drive used in army cargo boats, tugs, navy barges, and exclusively in LST's.

TODAY... Gruelling tests in which couplings are being operated under severe misalignment, and gear tests at speed step-ups as high as 30,000 revolutions per minute are now in progress.

** Falk technicians are never satisfied that they have reached the ultimate. Here, in this photograph, the helical lead of a turbine reduction gear is being checked on a lead checking machine.

THE FALK CORPORATION, MILWAUKEE 8 WISCONSIN

For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Contract Welding and Machine Work. • District Offices, Representatives, or Distributors in principal cities.

IT ALWAYS PAYS TO CONSULT FALK . . . A GOOD NAME IN INDUSTRY

GREEDY GONDOLAS CALL FOR FASTER DRILLING— WITH COALMASTER TOOLS

- Heat treated alloy steel bits drill faster.
- Straight, clean holes make it easy to insert the stick.
- Patented hexagon coupling reduces auger changing time.
- Safety sockets prevent injuries.
- Less driller fatigue—less time loss.

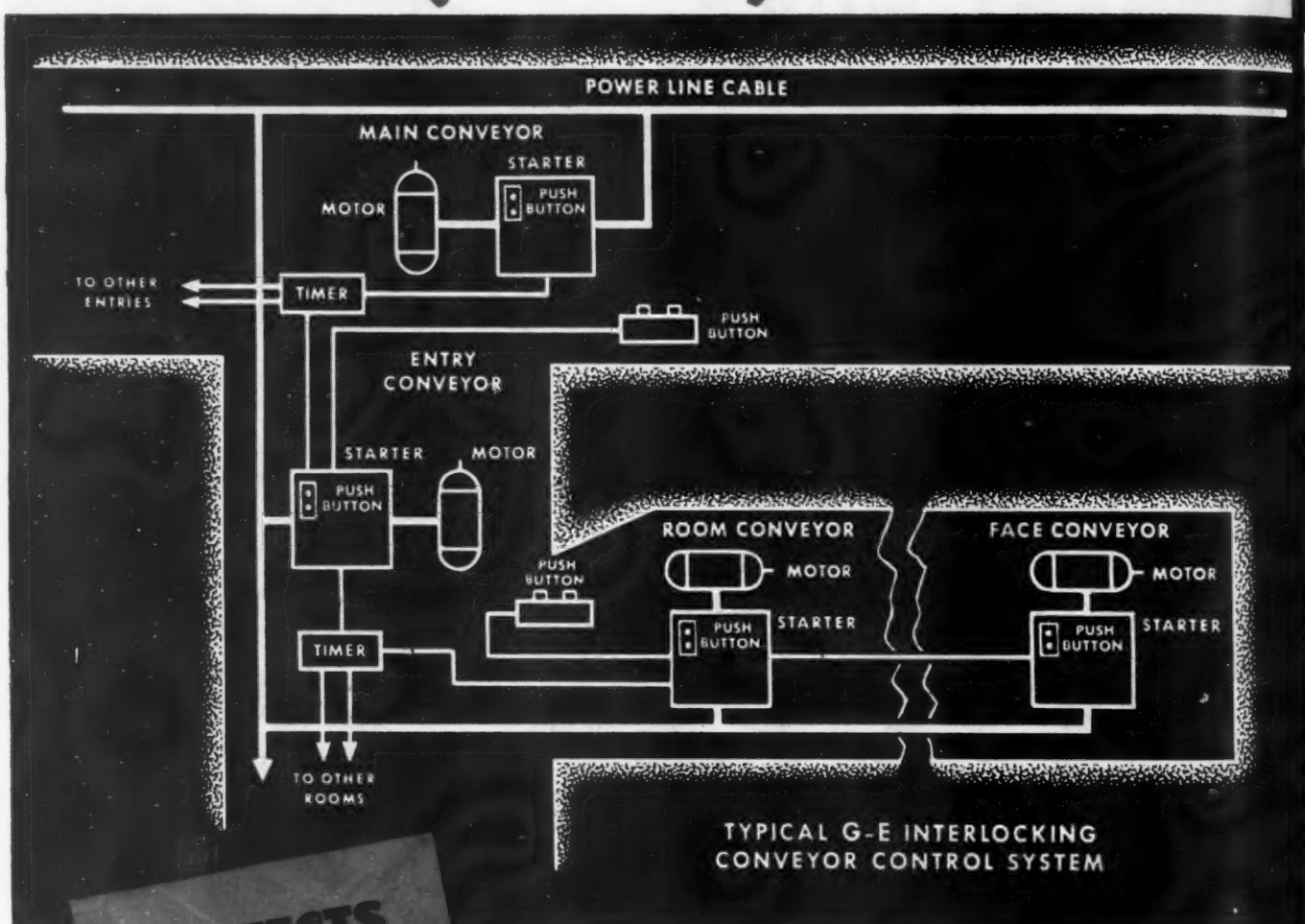
COALMASTER "Matched Set" Drilling Tools at the face mean more tonnage at the tipple.

DRILLING COALMASTER TOOLS

CENTRAL MINE EQUIPMENT CO.

ST. LOUIS 8, MO.

MORE SAFETY for *Conveyor Operation*



PROTECTS PERSONNEL . . . Keeps Production Moving!

This schematic diagram shows a typical co-ordinated system of interlocking conveyor controls that will reduce confusion, accident hazards, and lost time. The motors are connected in sequence, so that if any one conveyor breaks down, all contributing conveyors are automatically shut down, thereby preventing coal pile-ups. All motors are started by momentary contact push buttons. Once a conveyor has stopped, unexpected restarts are impossible until that particular conveyor's START button is pushed. Push-button stations can be either in the controller, at remote-control stations, or a combination of both, whichever is best adapted to efficient operation.

A prime cause of large voltage dips and momentary overloading of the power system has been the tendency of all motors in an interlocking system to start at the same time. In the G-E systems, sequence interlocking or timers so regulate motor-starting that the motors always restart one at a time.

New G-E interlocking conveyor controls for gassy mines

prevent { COAL PILE-UPS | UNEXPECTED RESTARTS | EXCESSIVE STARTING LOADS

NOW you can have safe, positive conveyor control that's co-ordinated "right down the line," from main conveyor to working face. And you can have it in gassy mines where permissible equipment is required.

The diagram opposite shows a typical arrangement of G.E.'s new control equipment for gassy mines in a conveyor control system that is fully co-ordinated and truly automatic. With a system like this you can eliminate the hazards of dangerous coal pile-ups and unexpected motor restarts. You can avoid the excessive current peaks which occur when too many conveyor motors start at once.

G-E engineers have had wide experience in putting conveying systems on a safe, efficient basis. Rather than supply you with equipment only, their objective is to recommend a complete plan which insures full protection against common conveyor hazards. If you feel that your conveying system needs tighter control, why not talk it over with a G-E sales engineer soon? *General Electric Company, Schenectady 5, N. Y.*

EQUIPMENT FOR BM-INSPECTED MINES

Explosion-proof Starters—Recommended for gassy mines where permissible equipment is required. This starter is built to meet all the requirements of BM Schedule 2E. Available for a-c full-voltage, d-c reduced-voltage, or d-c full-voltage starting. All have a START-STOP push-button station in the enclosure cover, and can be reversing or nonreversing.

Push-button Stations—The G-E START-STOP, momentary-contact push button, either in the cover of the starter or remotely mounted, is made according to the requirements of BM Schedule 2E and provides undervoltage protection. Unexpected motor restarts which might cause injuries to operators are avoided because the START button must be pushed to restart the conveyor motor.

"BM" Motors—These sturdy conveyor "workhorses" meet all the design requirements of Bureau of Mines Schedule 2E. Their totally enclosed, fan-cooled construction effectively seals out dirt, dust, and dripping water, assuring long life and little maintenance. Available in all popular sizes and types to meet your mine requirements.

Buy all the BONDS you can—*and keep all you buy*

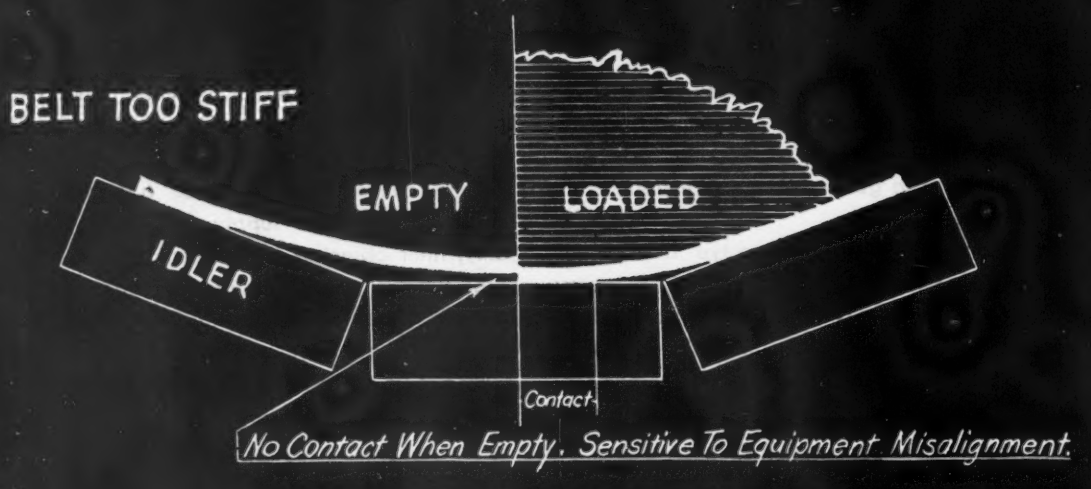
GENERAL ELECTRIC

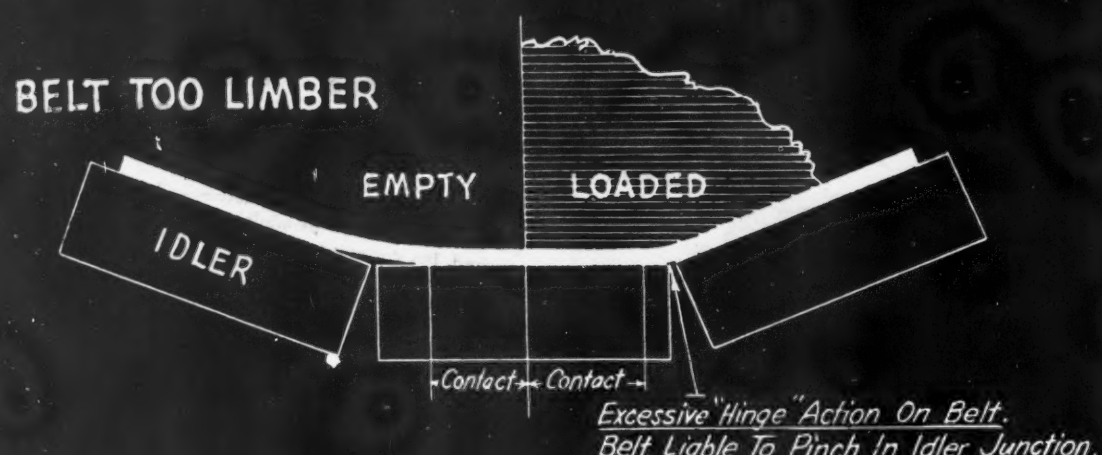
657-44-148

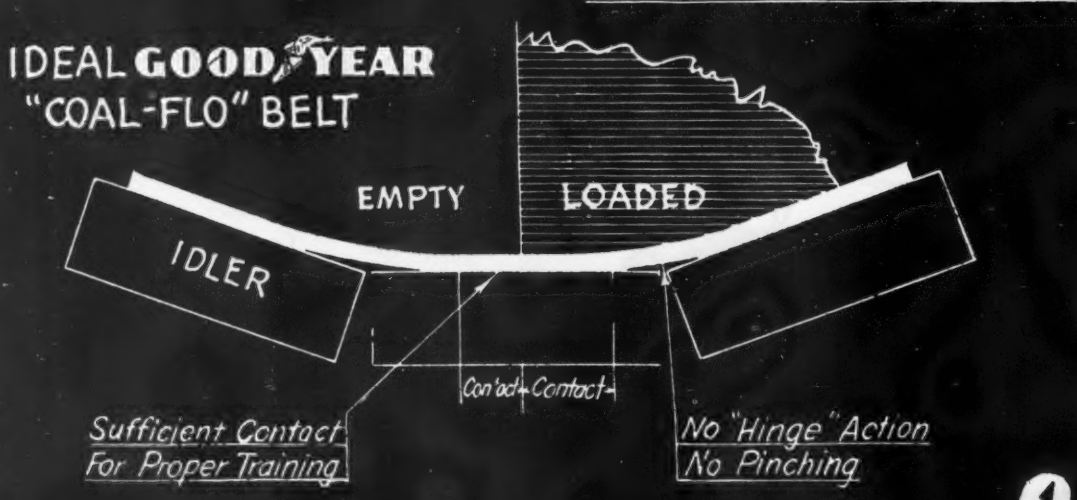
GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GTM - Specified

TROUGHING GUIDE for coal mine conveyor belts







A new guide to
LONGER CONVEYOR BELT LIFE

—another exclusive feature of GOODYEAR "COAL-FLO" belts

THE way a conveyor belt "troughs" — accommodates itself to the supporting idlers — is a major factor in performance, especially on sectional underground equipment. If a belt is too stiff, does not contact the center idlers properly, it may run out of line and suffer ruinous edge-wear in a short time.

On the other hand, a too limber belt flattens out between the idlers, tends to spill the load, and has to reshape itself and the load at each idler stand. This consumes extra power, puts undue strain on belt and fasteners, causes excess cover wear and shortens carcass life. And a too soft belt may also become pinched and cut in the idler joints.

NOW — CORRECT TROUGHING INDICES

To eliminate these dangers, proper troughing indices have been worked out by the G.T.M. — Goodyear Technical Man — for all widths and thicknesses of belting. This formula is now employed in the construction of all Goodyear "Coal-Flo" conveyor belts.

As a result "Coal-Flo" belts train easier and hold their alignment on compact underground setups with close clearances. They hold their shape between idlers — do not wear themselves out with wasted frictional work. They are designed and built to trough properly.

That is only one of the reasons why 95% of all Goodyear conveyor belts are still working after six to eight years' service underground. To get the complete story, backed by mine records, call in the G.T.M. Just write: Goodyear, Akron 16, Ohio or Los Angeles 54, California.

FOR HOSE, BELTING, PACKING, MOLDED RUBBER GOODS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

"Coal-Flo"—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR CONVEYOR BELTS THAN ON ANY OTHER KIND

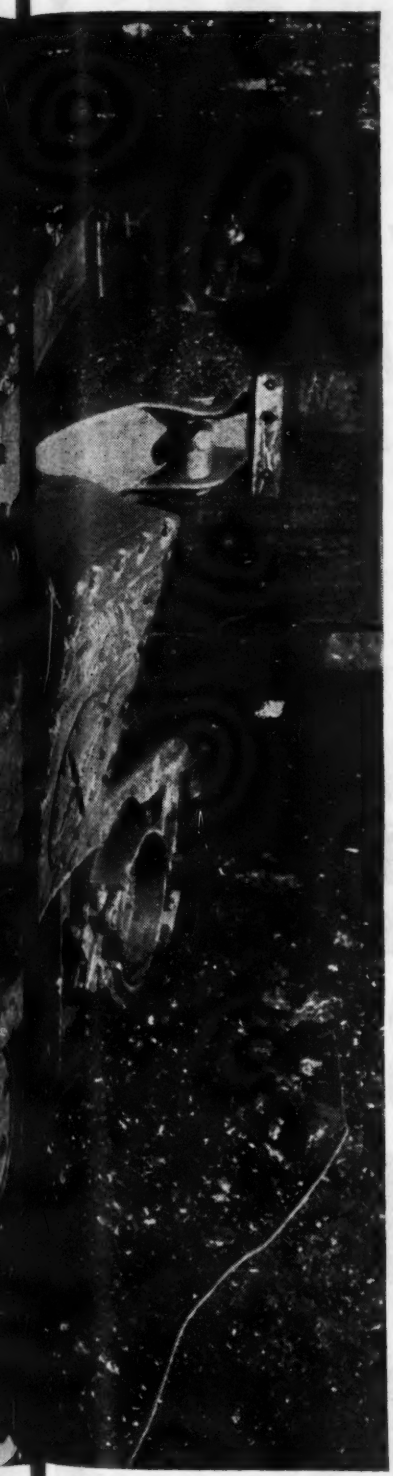
MAINTAINING PEAK

TEXACO

REG. T.M.

TEXACO LUBRICANTS

LOADER OUTPUT



WHEN mechanical loaders are inoperative — *even for as little as one percent of the time per shift* — the result is loss of thousands of tons annually. For this reason, maintaining peak loader output is of vital importance in meeting today's record demand for coal.

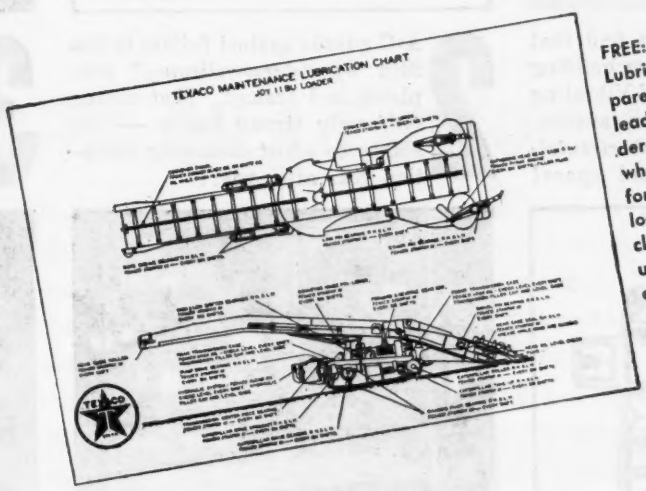
To help achieve this goal, units must be kept loading at full capacity at all times. This calls for effective lubrication—*Texaco.*

Texaco Starfak, for instance, is widely used in grease-lubricated ball and roller bearings of electric locomotives, cutters loaders, shuttle cars, etc. *Starfak* resists separation, leakage and oxidation, and helps greatly to increase bearing life.

Texaco Regal Starfak provides effective lubrication for grease lubricated ball and roller bearings over a wide range of temperature conditions.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write:

The Texas Company, *National Sales Division, Dept. C.,* 135 East 42nd Street, New York 17, N. Y.

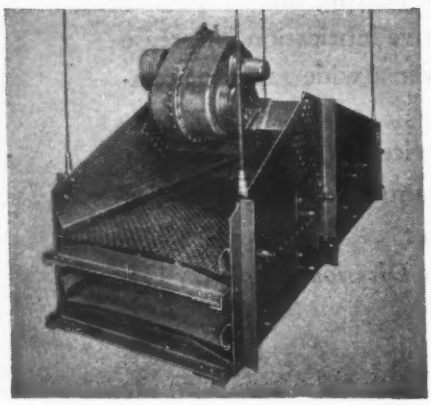


FREE: Texaco Maintenance Lubrication Charts are prepared in cooperation with leading manufacturers of underground mining machinery who approve Texaco products for use on cutters, loaders, locomotives, etc. Charts show clearly where, and when to use the proper Texaco lubricant. Order the Charts you need by make and model of each machine.

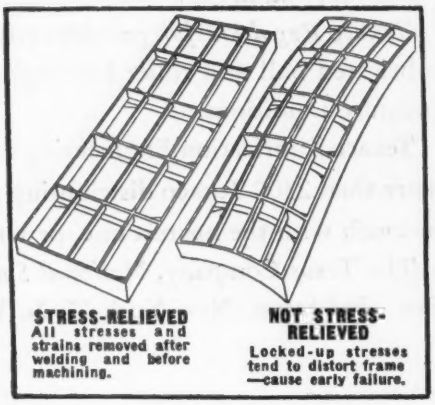
For the Coal Mining Industry

"LOW-HEAD"

HERE'S A MULTI-PURPOSE SCREEN THAT OPERATES HORIZONTALLY--SAVES SPACE, CUTS INSTALLATION COSTS!

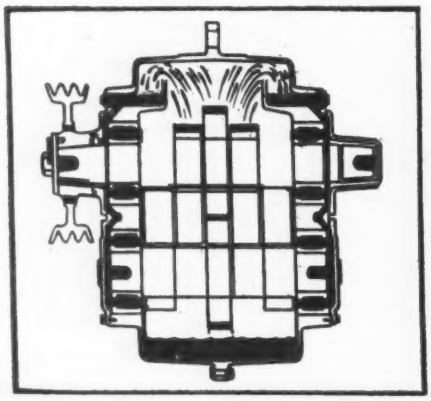


1 Want to remodel, but find that *inclined* screens require building changes? "Low-Head" Vibrating screens may be your answer. Reason: They operate *horizontally*—save headroom and space!

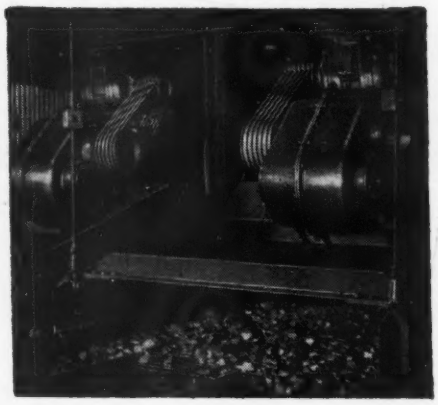

STRESS-RELIEVED
All stresses and strains removed after welding and before machining.
NOT STRESS-RELIEVED
Locked-up stresses tend to distort frame —cause early failure.

2 A-C guards against failure in the field by *"stress-relieving"* side plates and frames. That means *uniformly* strong bodies — the ability to *resist* damaging vibration year after year!

3 One user reports he's getting *up to double* cloth life! Good reason is A-C research in development of support frames with adequate strength and correct crown for different grades of surfaces.



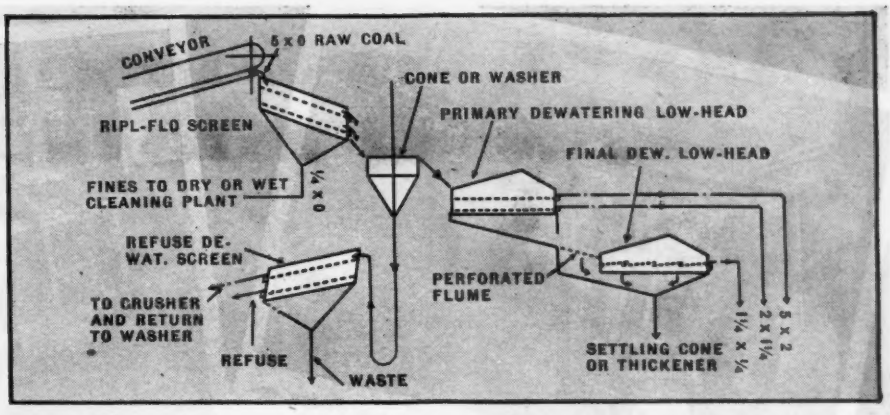
4 Operators like this compact mechanism—it's *easy* to inspect. And they don't worry about dust or oil. Mechanism is *totally enclosed*—gears and bearings are *continuously* splash-lubricated!



5 Two of many "Low-Head" screens speeding-up vital U.S. coal output. You'll find others at work on a wide range of products . . . from gravel and metallic ores to wood chips and foundry sand!

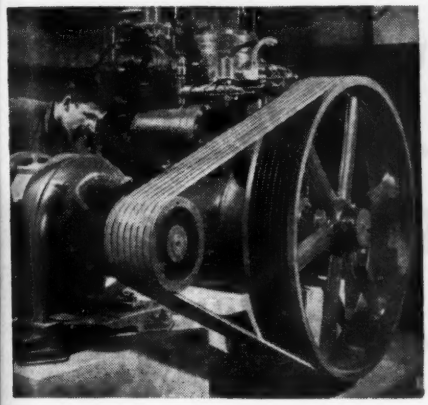
6 "Low-Head" screens are *versatile* —not only save you headroom, but can be used for wet or dry screening, dewatering, rinsing! For details on these modern screens, send for bulletin B6330.

7 Cooperating with tipple manufacturers, A-C is offering a *new* screen deck—the "End-Tension" deck—*which recovers saleable coal* from sludge—assures *maximum* dewatering efficiency.



8 Schematic flow sheet shows *final dewatering* "Low-Head" screen with new "End-Tension" deck—preceded by *primary dewatering* standard "Low-Head" screen—and "Ripl-Flo" raw coal screen.

9 One operator reports that surface moisture on 13/16 x 14 mesh coal *is reduced 4%* with end-tensioned deck "Low-Head" screen which replaced a conventional shaker type screen.



10 A-C is the *only* company that builds basic processing equipment *plus* motors, controls, Texrope drives. That means *unit-responsibility*—no "buck-passing"!

11 Planning ahead for more efficient power distribution in your plant? This scale model "Unit Substation Builder Set" can help you plan *visually*—saves time!

12 New type "CW" Pump lowers cost-per-ton of *solids* handled over similar units—is representative of performance on other A-C pumps rated from 10 to 150,000 gpm.

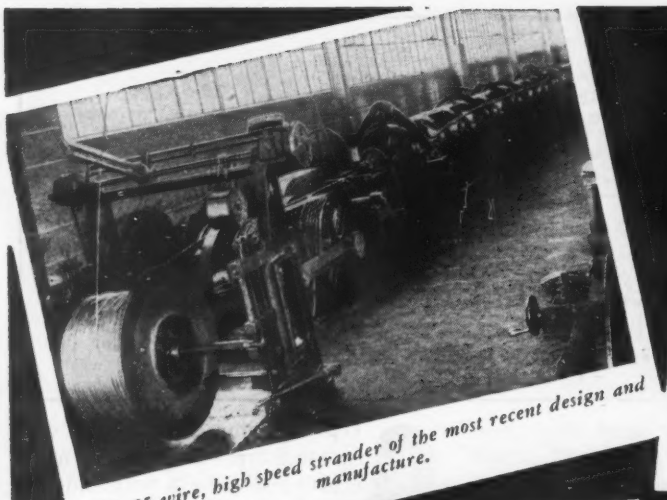
♪ *Tune in the Boston "Pops", Blue Network, Saturdays at 8:30 pm, EWT.*

YOU CAN DEPEND ON A-C RECOMMENDATIONS!

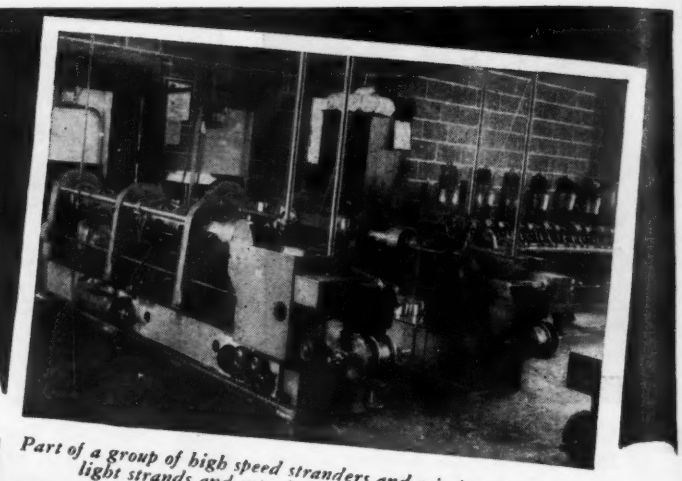
Allis-Chalmers builds *7 major lines,* many types and styles of basic equipment for coal producers. When you need screens, for example, you can select from 4 *different* styles. Same holds true for pumps, motors, V-belt drives . . . almost *everything* A-C builds for coal! What does this mean to you? For one thing, *greater choice* — assurance that the equipment A-C recommends will be suited to the *exact* job to be done . . . isn't just an *improvised* way of doing it! A.1881

ALLIS CHALMERS

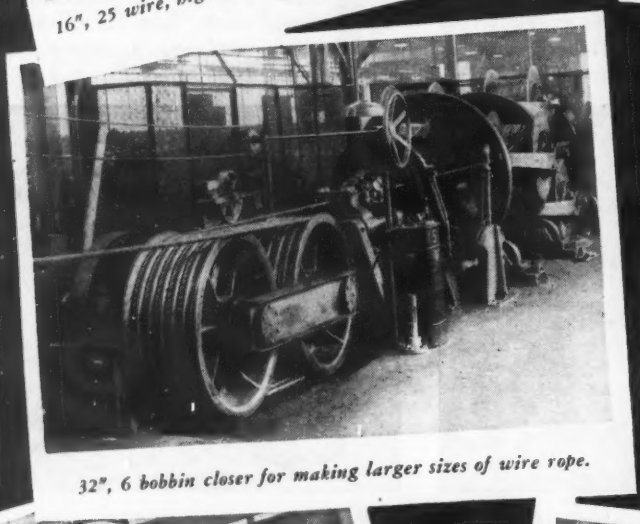
MILWAUKEE 1, WIS.



16", 25 wire, high speed strander of the most recent design and manufacture.



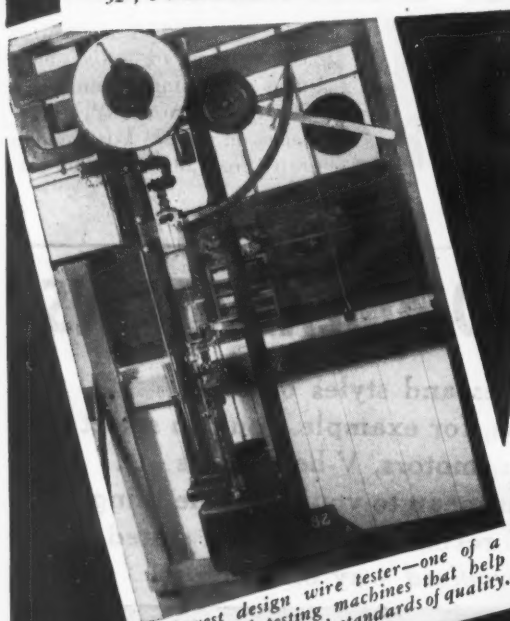
Part of a group of high speed stranders and winders for making light strands and rope for aircraft and other uses.



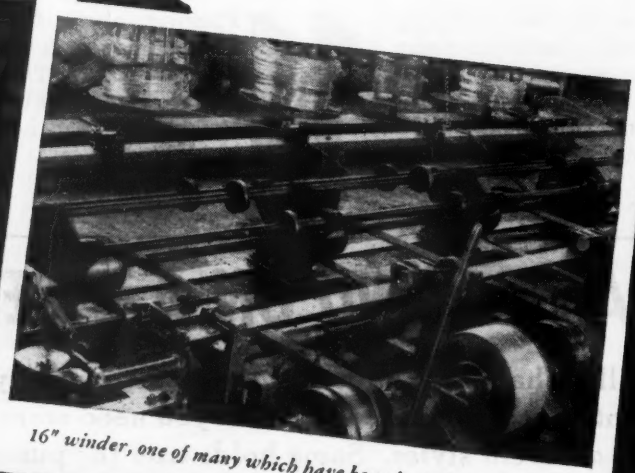
32", 6 bobbin closer for making larger sizes of wire rope.

THE NEWEST, FINEST EQUIPMENT

...Another reason Upson-Walton Wire Rope is Better Wire Rope



Newest design wire tester—one of a battery of testing machines that help maintain U-W high standards of quality.



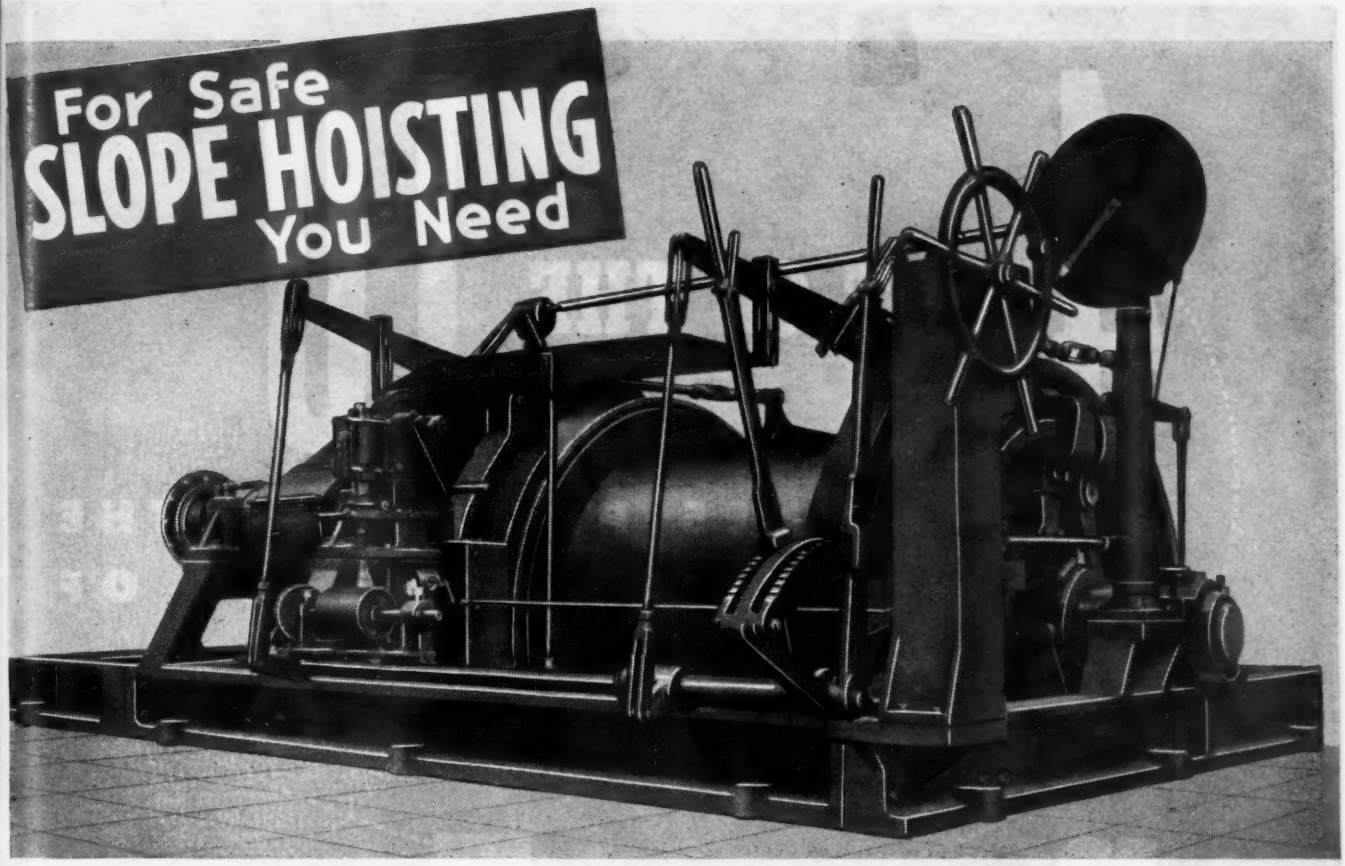
16" winder, one of many which have been installed recently.

THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 — 737 West Jackson Boulevard, Chicago 6 — 241 Oliver Building, Pittsburgh 22



. . the Vulcan Delayed-Action Safety Device

Experienced mining men know how desirable it is that automatic application of the brakes on a slope-hoist drum should be delayed until the upward momentum of the trip has stopped and it begins to move back. Accumulation of slack is thereby prevented—eliminating danger of over-running the rope, or of breaking it if the trip falls back rapidly enough to take up the slack with a sudden jerk.

The Vulcan Delayed-Action Safety Device supplements the well-known Vulcan Dead-Weight Safety Device so that—when the electric power fails, or is cut off by action of either the overspeed governor or the travel-limit control—the magnet plunger falls only a fraction of an inch before coming to rest on a small revolving drum. This drum is chain geared so that its rotation is synchronized with that of the hoist drum, and the magnet plunger is so hinged that it cannot complete its fall while the small drum is revolving toward it. When the drum has turned back a quarter of a revolution, however, the magnet plunger does complete its fall; thereby loosening the latch which supports the heavy "dead weight" and automatically applying the brakes.

As indicated by the illustration above most new Vulcan slope hoists are now equipped with this device but our engineers also welcome opportunities to promote safer operation by submitting plans and specifications for its application to slope hoists already in service.

NOTE: Illustration above shows the Delayed-Action Safety Device applied to a 350 hp. Vulcan Slope Hoist with hand-operated brakes. It is equally applicable, however, to our larger hoists having brake engines operated by either air or oil-hydraulic pressure systems.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

4 OUT OF THE 10

MINES PRODUCING THE LARGEST TONNAGE OF COAL IN 1943 . . .

NEW ORIENT, C. W. & F. ILL.—2,914,539 tons. BUCKEYE, NEMACOLIN, PA.—2,106,577 tons. VALIER, ILL.—1,851,935 tons. PEABODY, TAYLORVILLE No. 9, ILL.—1,792,572 tons.

3 OUT OF THE 7

MINES DEVELOPED IN '43, '44, '45, WHOSE TONNAGE SHOULD PLACE THEM AMONG THE TOP TEN BY 1946

STONEGA, KY.—2,000,000 tons
STANSBURY, WYO.—2,000,000 tons
HORSE CANYON, UTAH—2,500,000 tons

Ten largest producers in 1943

(1)—Filbert, Frick, Pa.—3,807,758, (2) New Orient, C. W. & F. Ill.—2,914,539, (3) Colonial, Frick, Pa.—2,723,946, (4) Consolidation, No 207-214, Ky.—2,508,204, (5) U. S. Coal & Coke, Lynch, Ky.—2,308,887, (6) Industrial Collieries, Barrackville, W. Va.—2,220,313, (7) Buckeye Nemacolin, Pa.—2,106,577, (8) Koppers, Federal No. 1, W. Va.—2,077,876, (9) Valier, Ill.—1,851,935, (10) Peabody, Taylorville No. 9, Ill.—1,792,572.

Seven new mines which should rank in top ten by 1946

(1) Turkey Pen, Ky.—2,000,000, (2) Stonega, Ky.—2,000,000, (3) Robena, Pa.—6,000,000, (4) Mathies, Pa.—2,000,000, (5) Stansbury, Wyo.—2,000,000, (6) Misco, Ohio—3,000,000, (7) Horse Canyon, Utah—2,500,000.

Source . . . King Coal Quiz compiled by Keystone Coal Buyers Manual

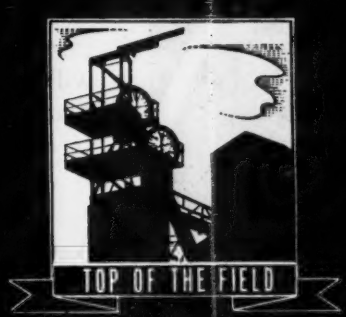
Engineered by

ALLEN & GARCIA

★ Most of the top ten were developed many years ago. They were planned, engineered, and developed as big mines from the start.

The experience gained by the Allen & Garcia staff in developing 4 out of 10 is serving today's clients well in the building of 3 out of 7 of the new production giants.

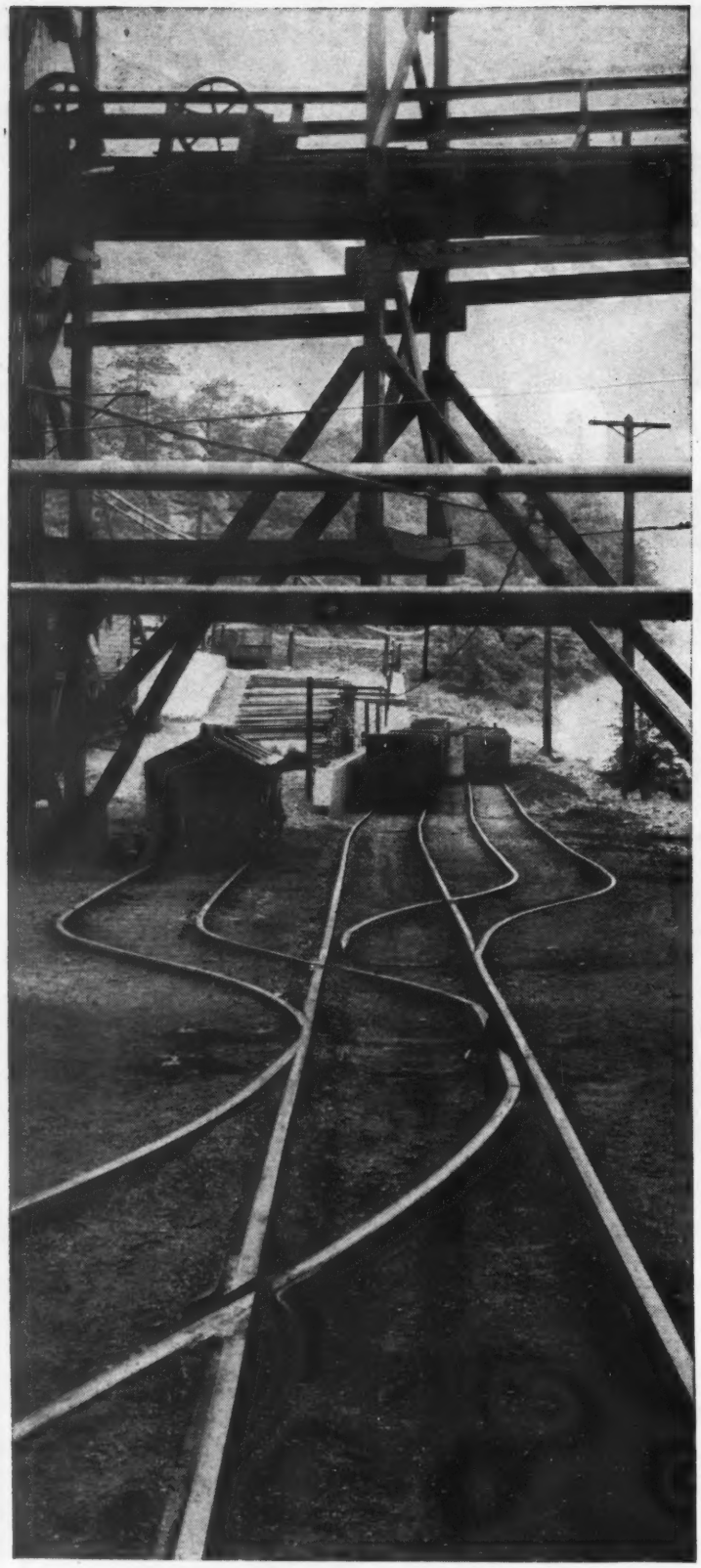
Large or small, above ground or below ground, the ALLEN & GARCIA COMPANY is well equipped to help you with your mine problems.



ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK, N. Y.



For Smooth Haulage ...*Safe* Haulage

Bethlehem prefabricated trackwork makes possible faster, safer haulage; increases coal production; reduces derailments, and makes installation much simpler.

Prefabricated trackwork takes many a load off the operator's mind. No longer does he have to do the cutting and curving in his own mine. He merely turns the whole problem over to Bethlehem engineers, together with a plan or drawing of his workings, and Bethlehem does the calculating, cutting, precurving, and fabricating—in shops where every modern facility is available.

Then the trackage is shipped "knocked down," ready for easy assembly at the mine. You get your entire layout, complete with rails, switch stands, switches, frogs, guard rails, splice bars, bolts, and everything else you need for a modern, smooth mine-track set-up. When the installation is underground, it includes rugged steel ties for room track and secondary haulageways.

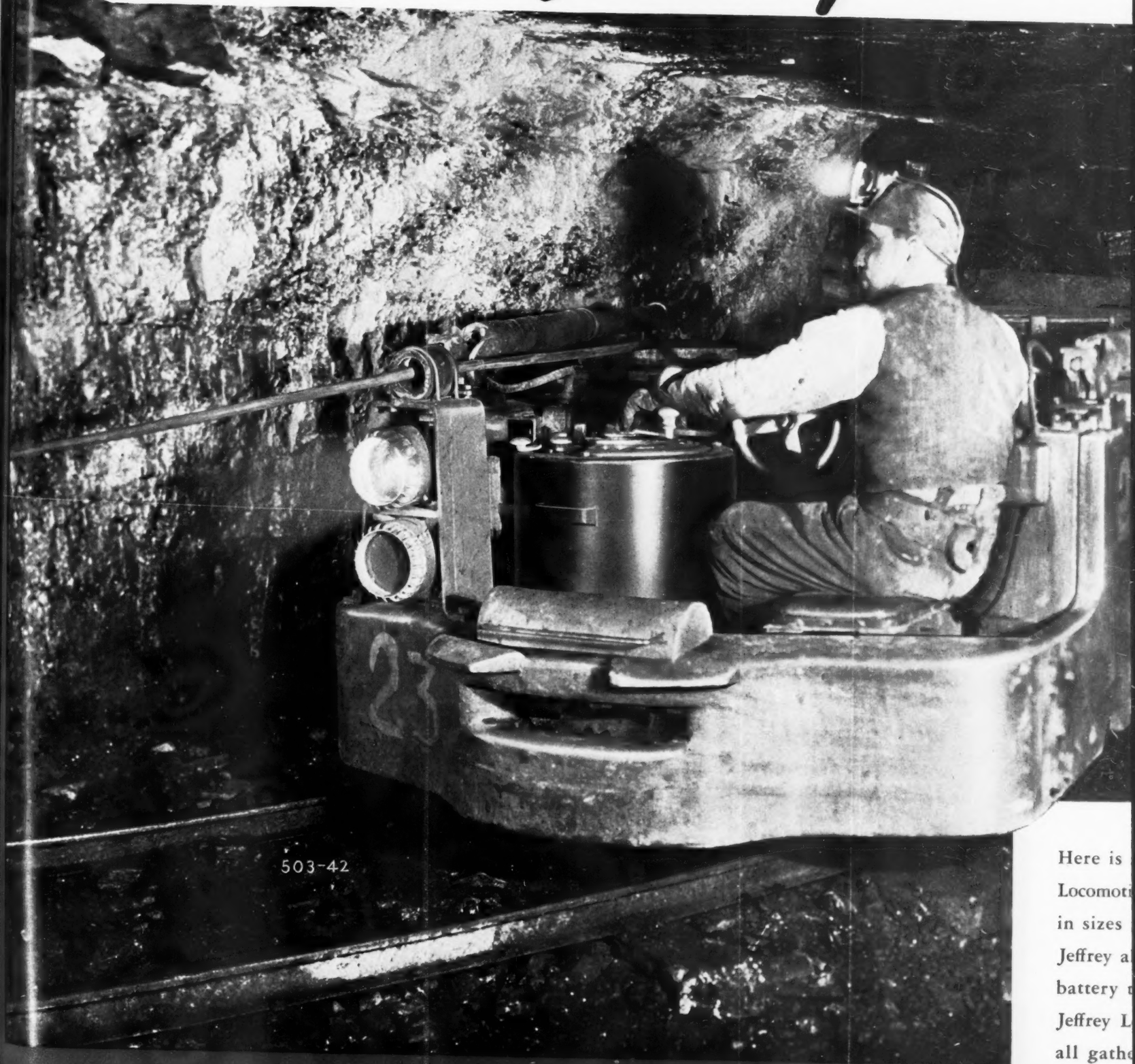
Bethlehem prefabricated trackwork has so many advantages that any printed description barely scratches the surface. If you are interested in safe, fast haulage—a system that will cut costs to the bone—ask a Bethlehem man for complete details.

←*Part of a Bethlehem surface installation (on 4 x 6 Ar-Moored Ties) at a well-known Pennsylvania coal mine. Note the smoothness of the track; the absence of ripples in the rails. Track like this means better haulage.*

BETHLEHEM PREFABRICATED TRACKWORK

BETHLEHEM STEEL

JEFFREY *Gathering* LOCO



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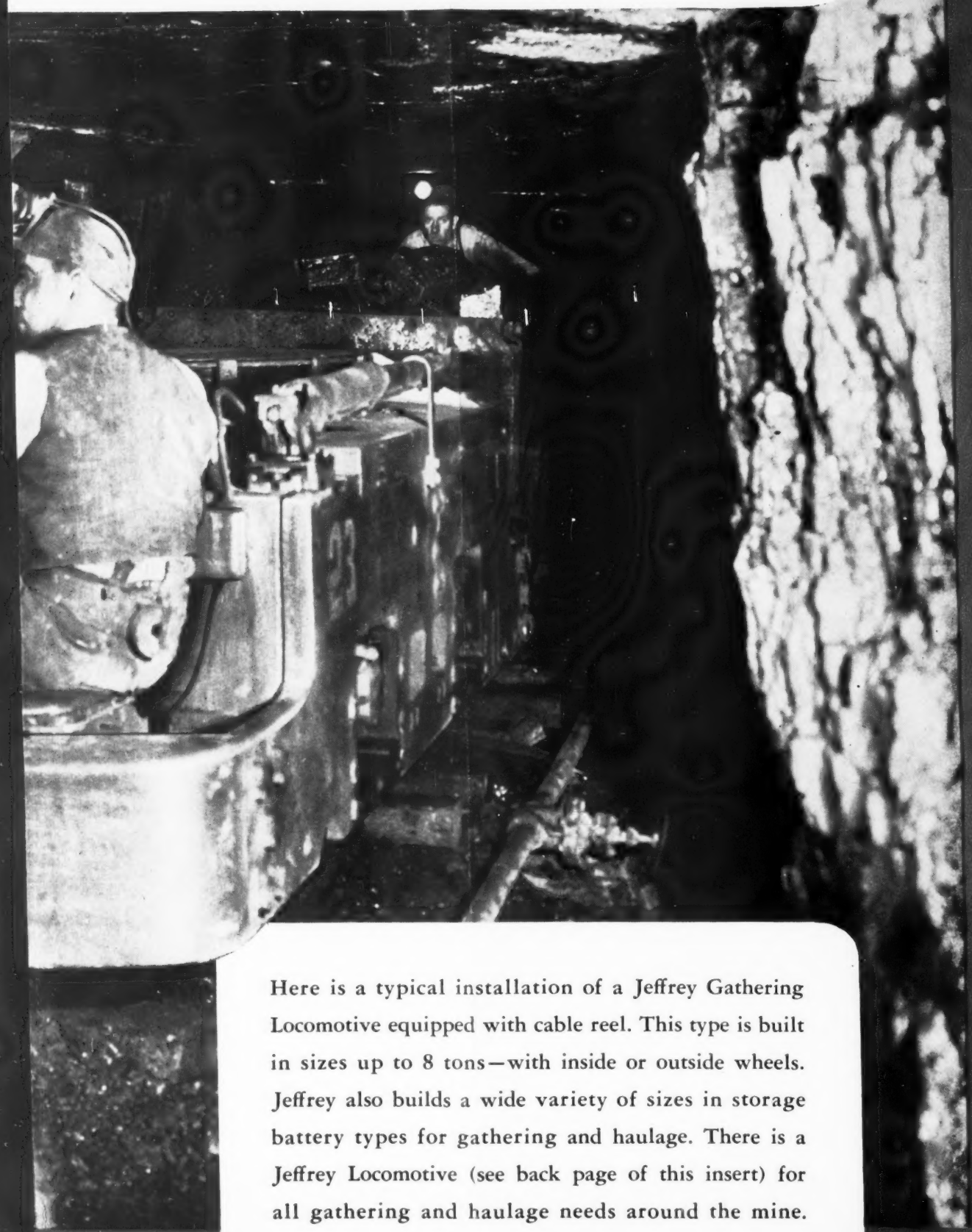
LOCOMOTIVES



Here is a typical installation of a Jeffrey Gathering Locomotive equipped with cable reel. This type is built in sizes up to 8 tons—with inside or outside wheels. Jeffrey also builds a wide variety of sizes in storage battery types for gathering and haulage. There is a Jeffrey Locomotive (see back page of this insert) for all gathering and haulage needs around the mine.

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QUIRES APPROXIMATELY ILLION TONS OF COAL ANNUALLY

to heat the Homes and cial Buildings of the United States

JEFFREY has a definite interest in this tonnage because of the vast number of Drills, Cutters, Loaders, Locomotives, Mine Conveyors and allied equipment as well as Replacement Parts used to produce this coal. Jeffrey builds a complete line of coal mining machinery—for below and above ground operation—has an engineering staff to help you select the right unit for your particular condition and need.

J.

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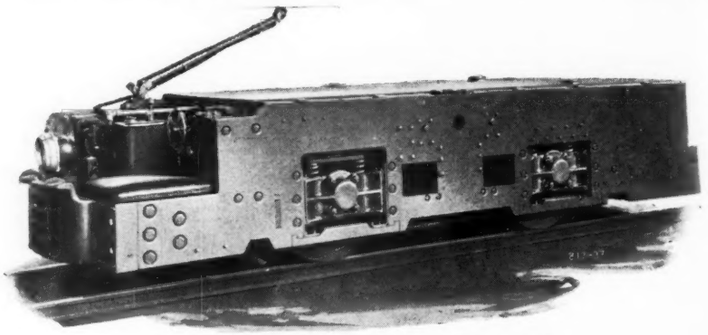
Jeffrey LOCOMOTIVES

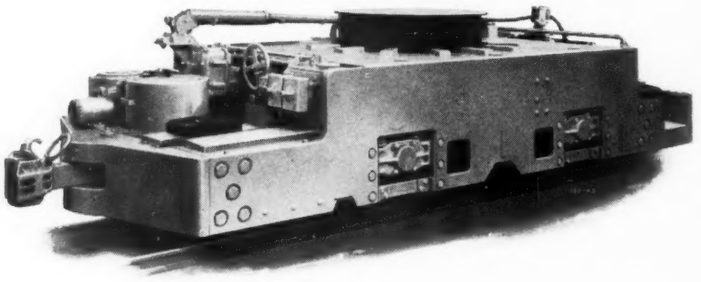
JEFFREY SERVICE TO THE COAL MINES MEANS SERVICE TO ALL INDUSTRY

JEFFREY EQUIPMENT FOR COAL MINES

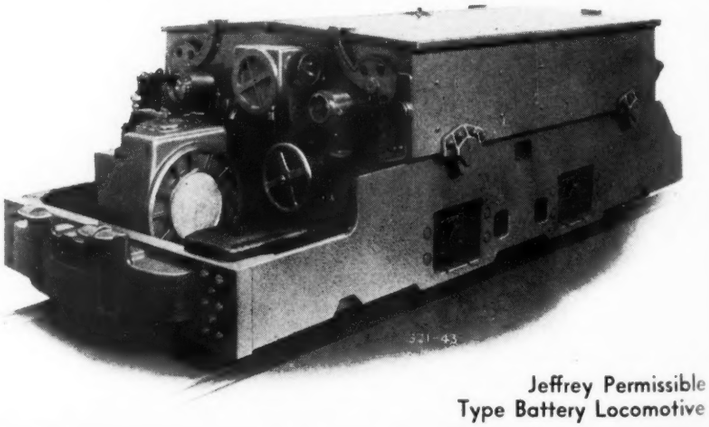
- BLOWERS
- CONVEYORS
- CRUSHERS
- CUTTERS
- DRILLS
- FANS
- JIGS
- LOADERS
- LOCOMOTIVES
- SCREENS



Jeffrey Trolley Type Haulage Locomotive



Jeffrey 8-ton Explosion Tested Gathering Locomotive



Jeffrey Permissible Type Battery Locomotive

THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:	Baltimore Birmingham Boston Buffalo	Chicago Cleveland Cincinnati Detroit	Denver Harlan Houston Huntington	Milwaukee New York Philadelphia Pittsburgh	Scranton St. Louis Salt Lake City
Service Stations:	Pittsburgh Harlan, Ky.	Birmingham St. Louis	Logan-Beckley W. Va.	Scranton	
Foreign Plants:	Jeffrey Mfg. Co., Ltd. Montreal, Quebec	British Jeffrey-Diamond, Ltd. Wakefield, England	Jeffrey-Galion (Pty) Ltd. Johannesburg, S. A.		

LUBRIC

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LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . . LUBRICATION ENGINEERING . . .

You get all of these advantages in one grease

A wide range of temperature application

Plus grease gun or one-shot lubrication

Plus unusually long life

Plus better lubrication—less thinning out

Send for this booklet

One outstanding advantage of Stanobar Grease is that it can be applied by grease gun on a wide range of anti-friction bearing lubrication jobs. That's because Stanobar Grease has a smooth, non-fibrous, texture which is unusual in a grease that is suitable for both high and low temperature service.

There are other reasons—explained in the booklet offered—why Stanobar Grease can help you eliminate grease lubricating problems. Send for a copy or ask a Standard Oil Lubrication Engineer about the application of Stanobar Grease on your particular job. Write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois, for the Engineer nearest you.

—it tells why Stanobar Grease gives the advantages listed above wherever it can be applied to your anti-friction bearing lubricating job. Ask your Standard Oil Industrial Service Representative for a copy of the book, or write or call the nearest Standard Oil Company (Indiana) office.

Buy more War Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

BIG *all the way through*

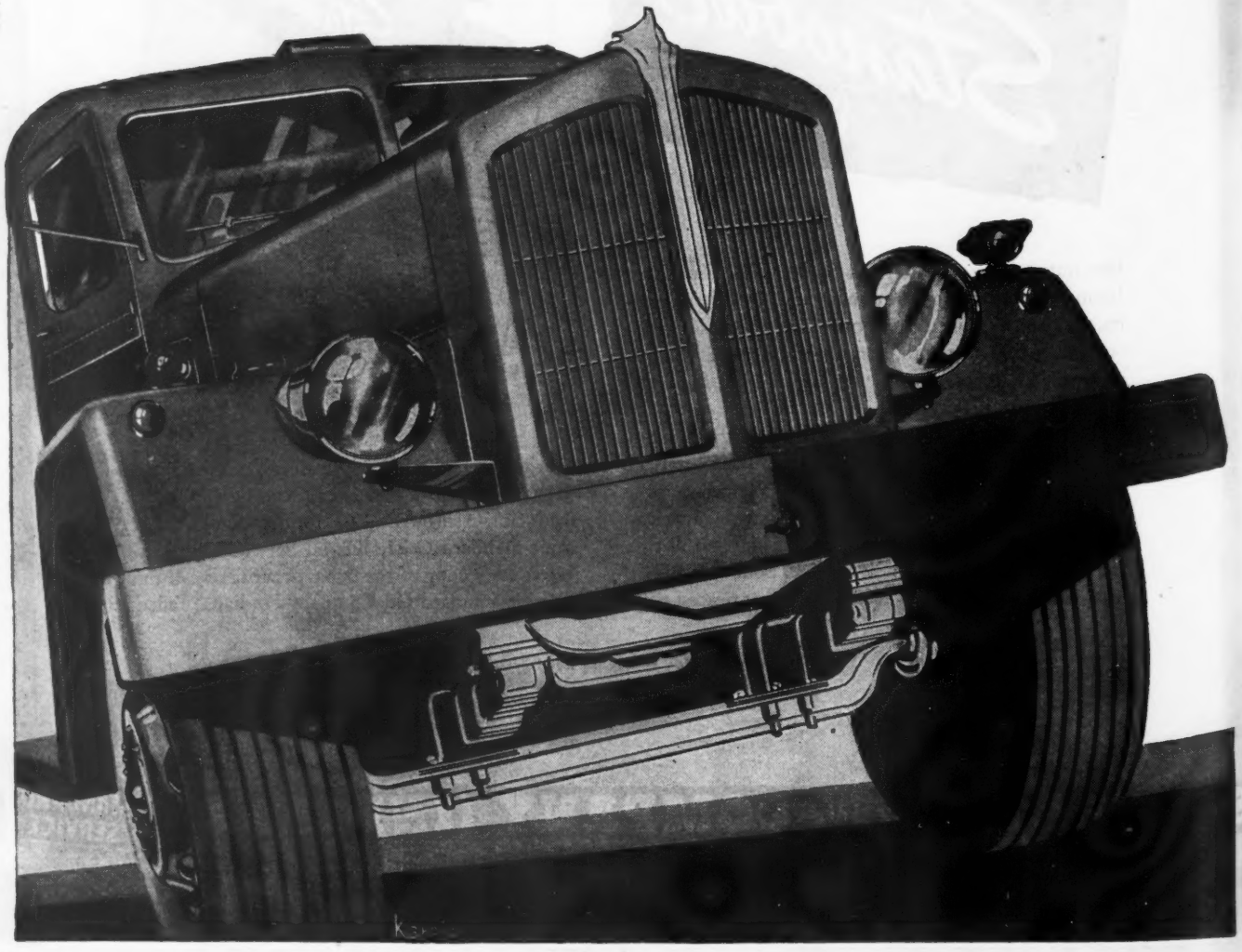
When you see the *new* Ward LaFrance commercial models, you'll be looking at something new in transportation . . . the toughest, sturdiest job on the highway. It's the "civilian" version of the great M1A1 Heavy Wrecker we have been turning out in volume for the Army, developed to be the last word in rugged truck performance . . . The new Ward LaFrance heavy-duty trucks are "built big" not only in rated capacity, but all the way through.

. . . If your fleet suffers from the usual profit-eating toll of axle failures, broken springs, burned clutches, the new Ward LaFrance is the common-sense answer to more dependable, lower-cost hauling. This stamina comes from a basic engineering principle of providing strength, more than sufficient for your requirements. Ward LaFrance has evolved a sales plan of unusual interest, which you should investigate. Write to our Sales Department today for details.

WARD LAFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC., ELMIRA, NEW YORK



from sand . . .

SILASTIC

the new DOW CORNING SILICONE RUBBER

SILASTIC QUALIFIES EQUIPMENT UNDER GRADE 1, CLASS 1 SPECS.

Resistors coated with SILASTIC SC-75 operate successfully at 275°C. and take the plunge from 275°C. into ice water nine successive times. This seemingly impossible shock performance permits resistors coated with SILASTIC SC-75 to qualify under Grade 1, Class 1 Specifications.

"Newsworthy" is the development by Dow Corning of yet another—and perhaps greater—contribution to the new-day efficiency and resourcefulness of American industry. SILASTIC* is the name of the product and silicone rubber is the achievement.

SILASTIC covers a variety of elastic silicone products made by Dow Corning from sand, modified by chemicals drawn from brine, coal and oil.

Being silicone rubber, SILASTIC exceeds in thermal stability the rubber we've known, whether natural or synthetic. SILASTIC retains complete flexibility—does not harden—in the temperature range—70°F. to 500°F. Its excellent dielectric properties—its arc, corona and oxidation resistance—assure durability of wire insulation under hot, wet service conditions.

For the immediate broad field of its usefulness, SILASTIC stocks are available for application by coating, extruding and molding.

DOW CORNING CORPORATION • MIDLAND, MICHIGAN

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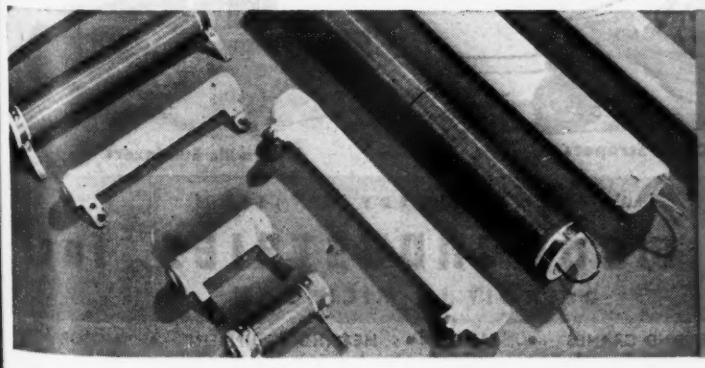


Dow Corning

FIRST "IN" SILICONES

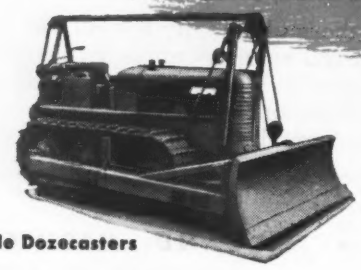
For the TOUGH Jobs Ahead!

GAR WOOD ROAD MACHINERY
WITH ALLIS-CHALMERS DIESEL POWER

When the tremendous after-Victory program of road building and construction breaks, all present indications point to these conditions: 1. An abrupt change back to the prewar trends of competitive contracting. 2. Ever lower costs will become increasingly important. 3. The profitable business will go to the contractors who use the most efficient methods and machinery.

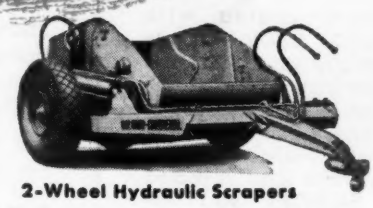
You can meet these conditions with Gar Wood Road Machinery and Allis-Chalmers Diesel Power. Here is an unbeatable combination that has what it takes to shove through the toughest jobs, fast—machinery that is dependable, economical, proved. Plan now to standardize on the complete line of Gar Wood Road Machinery. Get the facts from your Allis-Chalmers dealer.

SPECIFY GAR WOOD FOR OUTSTANDING PERFORMANCE

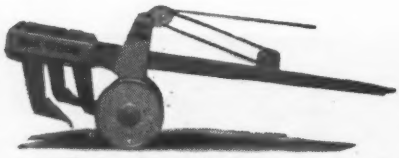


Cable Dozecasters

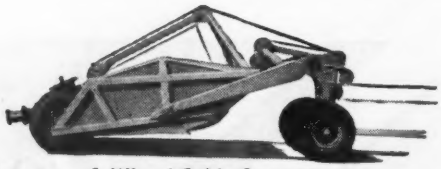
4-Wheel Hydraulic Scrapers



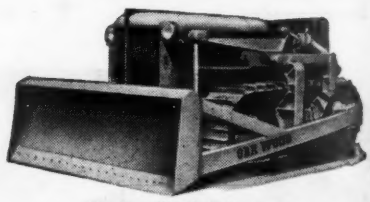
2-Wheel Hydraulic Scrapers



Heavy Duty Rippers



4-Wheel Cable Scrapers



Hydraulic Bulldozers

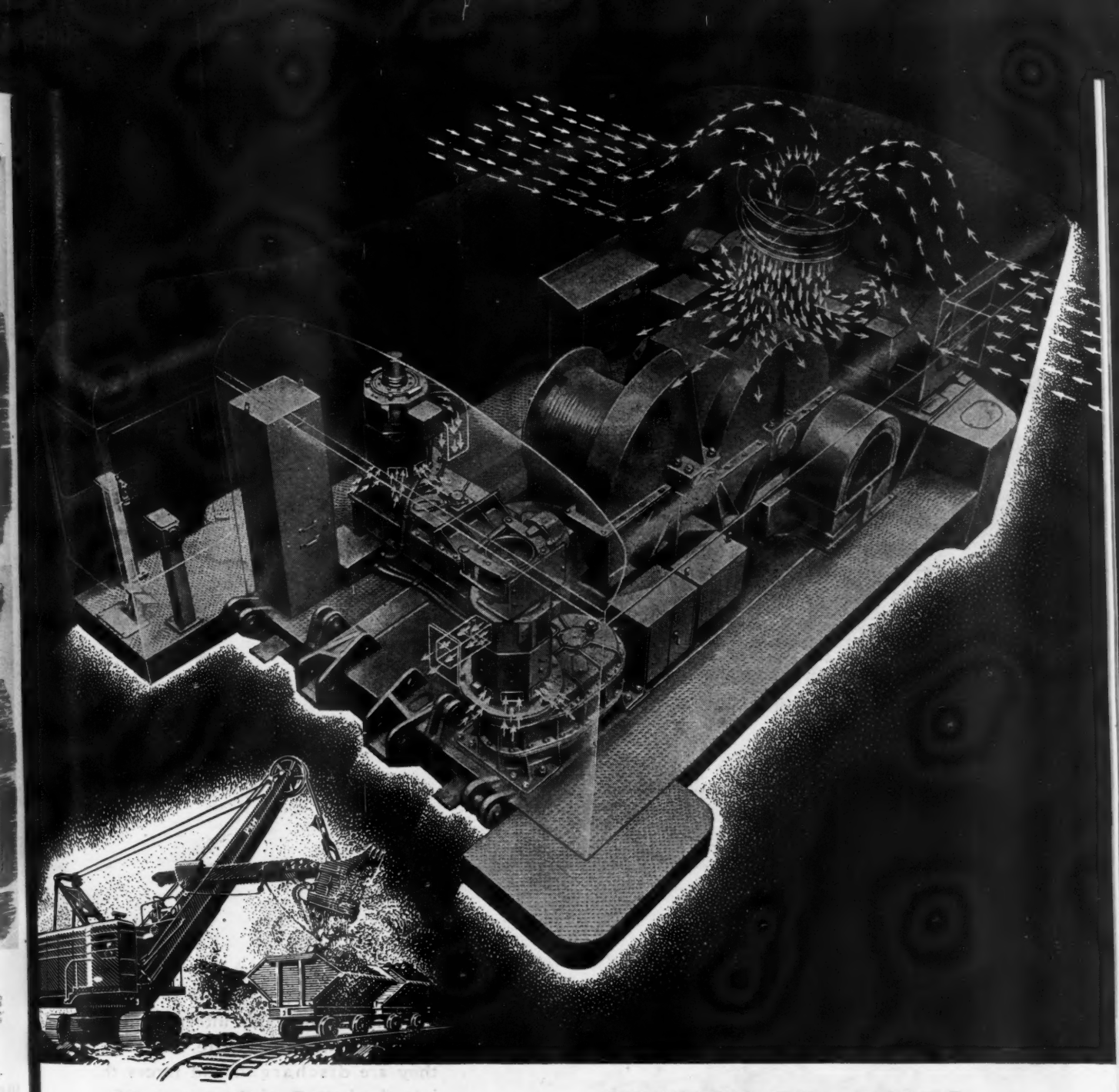
GW ROAD MACHINERY Is Sold Through ALLIS-CHALMERS Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.

DETROIT 11, MICHIGAN

OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS



How Saboteurs are FILTERED OUT!

It's a smart electric shovel that guards against such enemies as dust, dirt and grime. Their annual toll runs into mighty big figures — in reduced operating efficiency of electrical parts — in damage to equipment — in loss of productive time. On the new P&H Electric Shovels, a highly perfected cab ventilating system filters out these air-borne saboteurs. It keeps abrasives out of electrical machinery — keeps down shovel maintenance costs — steps up shovel working time.

Only clean air enters the P&H cab. Drawn in through filter banks by a centralized independent blower unit, the air is circulated to motors and generators. Once used, air is exhausted direct to the outside . . . not recirculated.

Here's an example of the care given to designing every detail of new P&H Electric Shovels in the interests of lower digging costs in open pits. Another example of P&H's 60 years of steady pioneering in applying electrical power to the movement of heavy loads.

P&H

ELECTRIC SHOVELS

4540 W. National Avenue
Milwaukee 14, Wisconsin

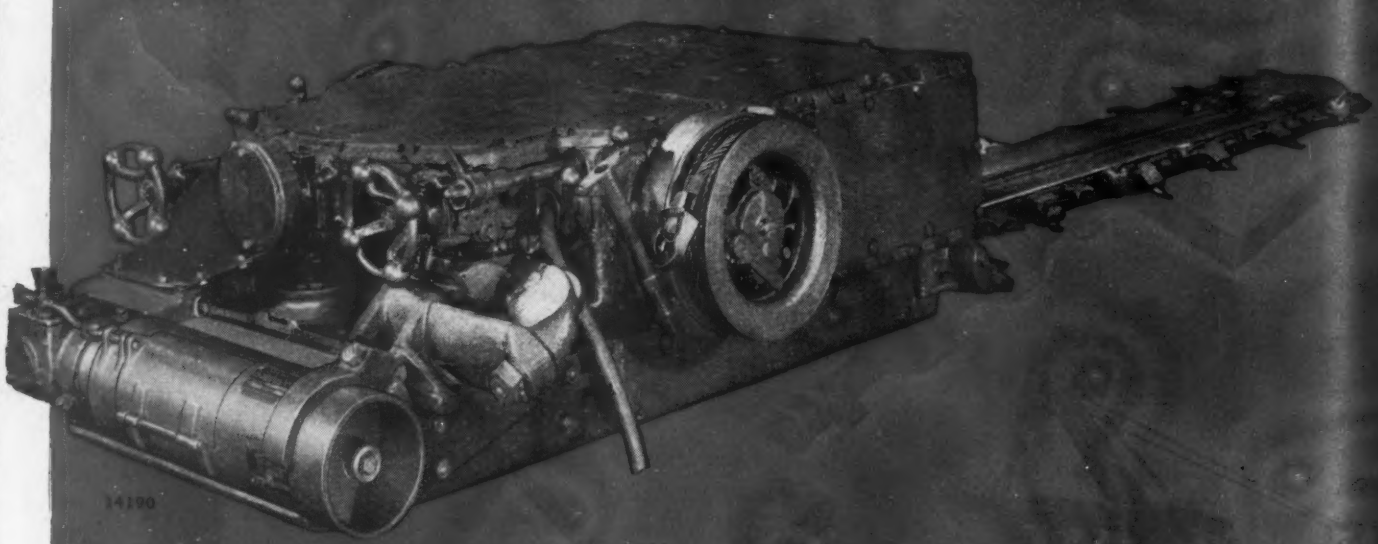
HARNISCHFEGER CORPORATION

EXCAVATORS - ELECTRIC CRANES - ARC WELDERS P&H HOISTS - WELDING ELECTRODES - MOTORS

THE GREATEST FORWARD STEP EVER MADE IN ELECTRIC SHOVEL DEVELOPMENT

THE Goodman

NEW OPERATING



Bugduster

A compact unit built integral with the machine that collects the cuttings as they are discharged and forces them into the bottom of the pile that forms at the rear and side of the machine away from the direction of cutting. The kerf is kept clean, hand shoveling is eliminated and there is no dust.

Power derived from the main motor and transmitted by chain drive through gearing to the screw.

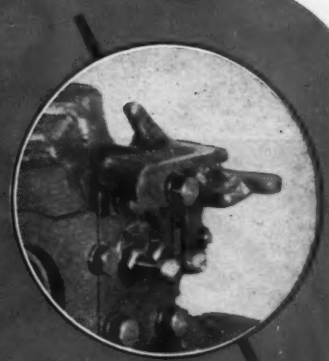
Clutch controlled to permit starting or stopping while main motor is running.

ARMY E NAVY

Goodman MANUFACTURING CO

512 Shortwall

FEATURES



The tilting mechanism responds quickly to the movement of these two levers. No effort required on part of the operator.

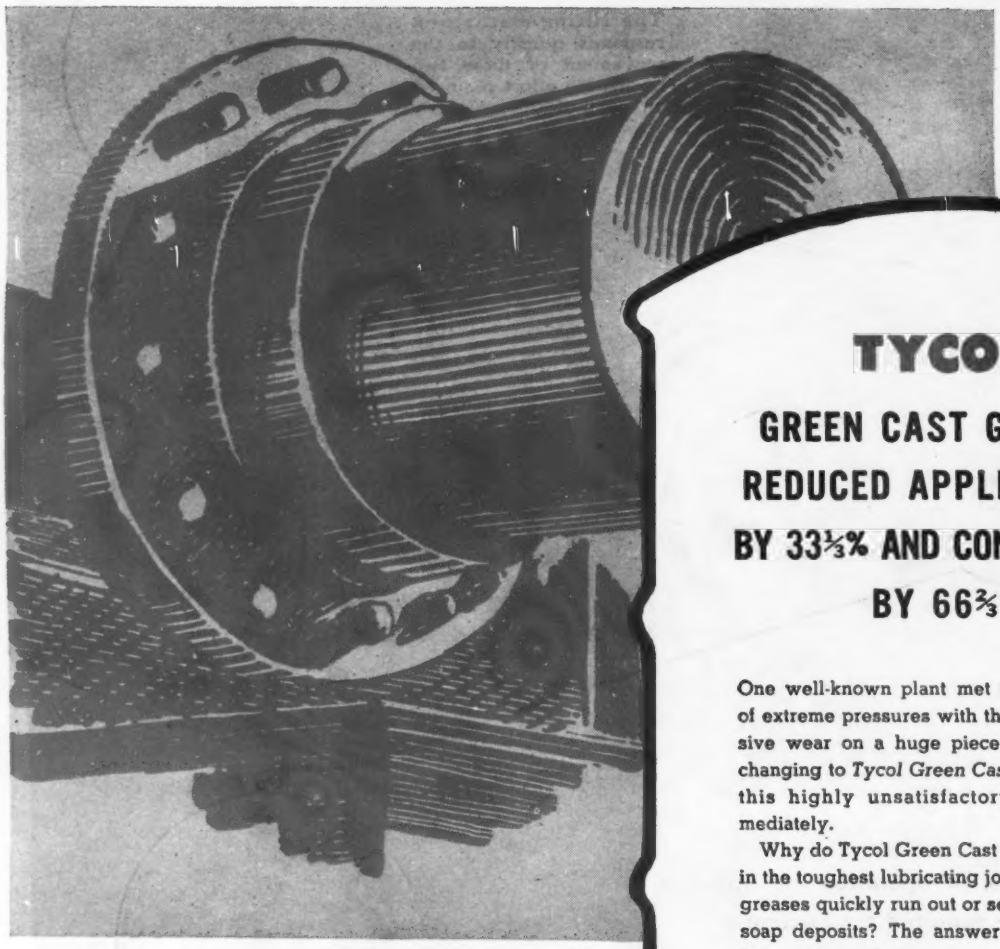
Hydraulic Control

Speed and ease of operation are outstanding. Time required for loading or unloading and to maneuver in the working place is lessened. Uneven bottom can be followed with accuracy.

A flip of these control levers is all that is needed to get immediate high or low speed on either wire rope drum.

G COMPANY • Halsted Street at 48th • Chicago 9, Illinois

"Engineered Lubrication"...t



TYCOL

GREEN CAST GREASES REDUCED APPLICATIONS BY 33⅓% AND CONSUMPTION BY 66⅔%

One well-known plant met the usual trouble of extreme pressures with the resultant excessive wear on a huge piece of equipment — changing to *Tycol Green Cast Grease* stopped this highly unsatisfactory condition immediately.

Why do Tycol Green Cast Greases stand up in the toughest lubricating jobs — where other greases quickly run out or separate into caked soap deposits? The answer is simple. Tycol Green Cast Greases are made from high quality cylinder stock and well refined neutral oil combined with a minimum of soap for a given consistency. Green Cast Grease is water repellent . . . and is engineered to "take it" under all conditions.

A Tide Water Engineer will be glad to give you full information.

DRUMS! DRUMS! DRUMS!

War needs make it extremely important that all empty drums be returned as soon as possible.

INDUSTRIAL TYCOL GREASES

TIDE WATER

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL
Eastern Division:
17 Battery Place, New York 4, N. Y.

..the TYCOL way

CUTS DOWN REPAIRS...
SPEEDS UP PRODUCTION

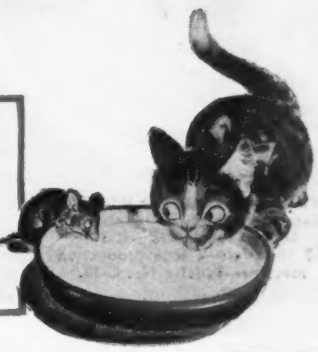
If you want peak efficiency . . . low-cost operation — turn to Tycol "Engineered Lubrication" for all-important help in securing these results. Why? Because each Tycol lubricant is scientifically engineered to meet definite service conditions . . . to reduce wear and maintenance costs to a minimum. That's why so many successful operators have turned to Tycol for low-cost lubrication.

In developing this individualized line of lubricants, Tide Water has complete control over its own products — from oil field, through transportation, to refining. The most modern processes are used to refine selected crudes . . . to blend and compound Tycol's "specifically engineered" oils and greases.

For complete information regarding the specific oils and greases best suited to meet your requirements, call or write your nearest Tide Water Associated office. There a Tide Water engineer, thoroughly experienced in all phases of industrial lubrication, will give you the full benefit of his knowledge.

Have you received your copy of "Lubricania"?

This informative handbook, "Tide Water Associated Lubricania", gives clear, concise descriptions of the basic tests used to determine important lubrication properties — Pour Points, Viscosity, Neutralization, and many others. For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

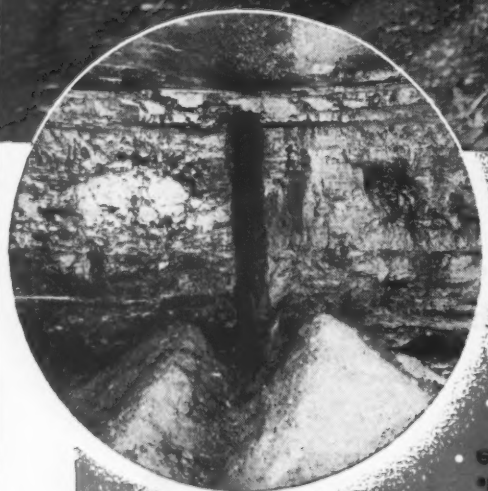


ASSOCIATED OIL COMPANY

Principal Branch Offices:

Boston • Philadelphia • Pittsburgh • Charlotte, N. C.

with the right cutting machine you get FASTER LOADING



WRITE FOR BULLETIN NO. C-10
Also 11-B Shortwall — only 21" high — Bulletin No. C-31.
7-B Shortwall—a high production machine—Bulletin No. C-30.

Licensed under patents to E. C. Morgan, No. 170691 - 170692 - 1707132 - 1953325 - 1953326.

compare the Sullivan 7-AU track cutter

- UNIVERSAL—will top, bottom and center cut; center, side and angle shear.
- SIMPLER CONSTRUCTION — only 20 gears and 6 hydraulic valve levers.
- GREATER RANGE—shears parallel cut 21'-8" apart; cuts from 10" below rail to 8'-6" above cuts 41'-1" horizontally with cylinder type roll.
- HYDRAULIC OPERATION—ALL cutting operations hydraulic except cutter chain drive.
- MORE FLEXIBLE — hydraulic control allows cutter bar to follow any irregularity in seam and variable feed permits maximum allowable cutting rate.
- TWO CUTS with one laying of track.
- CUTS and shears room necks without the laying of turnout switches.
- CUTS over large amounts of broken down draw slate.
- FAST TRAMMING — anti-friction axle construction; positive control.
- DUAL CONTROLS — standard equipment.

ARMY NAVY

SULL

- a world-wide organization

and MORE TONNAGE—

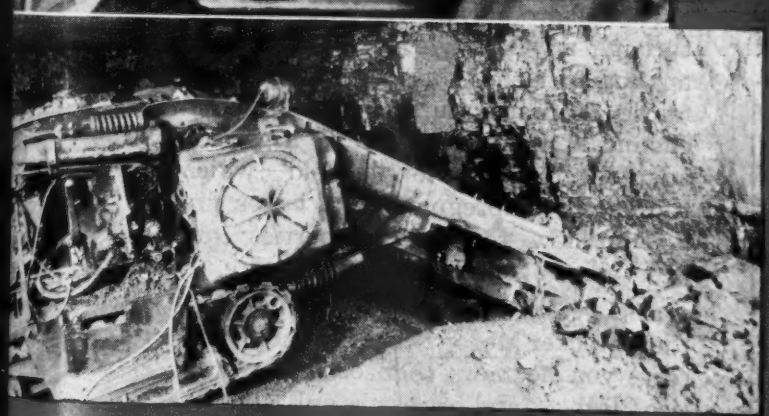
...it's the 7-AU!

HERE'S WHY: The Sullivan 7-AU Universal Track Cutter insures greater loading efficiency and higher tonnage (particularly where mobile loaders are used) for the following reasons:

1. *Capacity to stay ahead* of loaders even with occasional interruptions in cutting.
2. Shearing like that shown in circle provides *looser coal.*
3. Greater reach means *full depth of cut* even when rooms have not been properly cleaned up nor tracks advanced after previous loading operation.
4. Greater horizontal cutting range means *room can be wider* if other conditions permit.
5. *Simplified,* time-proven design minimizes breakdowns or maintenance.

All of these things add up to more tonnage per cut, more tonnage per loader shift and more tonnage per man. The 7-AU provides a method of face preparation that pays! For information, address the nearest branch office.

Sullivan Machinery Company.
Executive Offices:
Michigan City, Indiana. In Canada:
Canadian Sullivan Machinery Co., Ltd.,
Dundas, Ontario.



Note how coal has fallen away from roof and forward due to shear cut.

SULLIVAN PRODUCTS

Coal Mining Machines • Stripper Haulers • Rock Loaders • Motors • Car Pullers
Air Compressors • Coal Drills • Rock Drills • Cutter Bit Sharpeners and Heaters •
Core Drills and Contract Core Drilling

SALES OFFICES IN:

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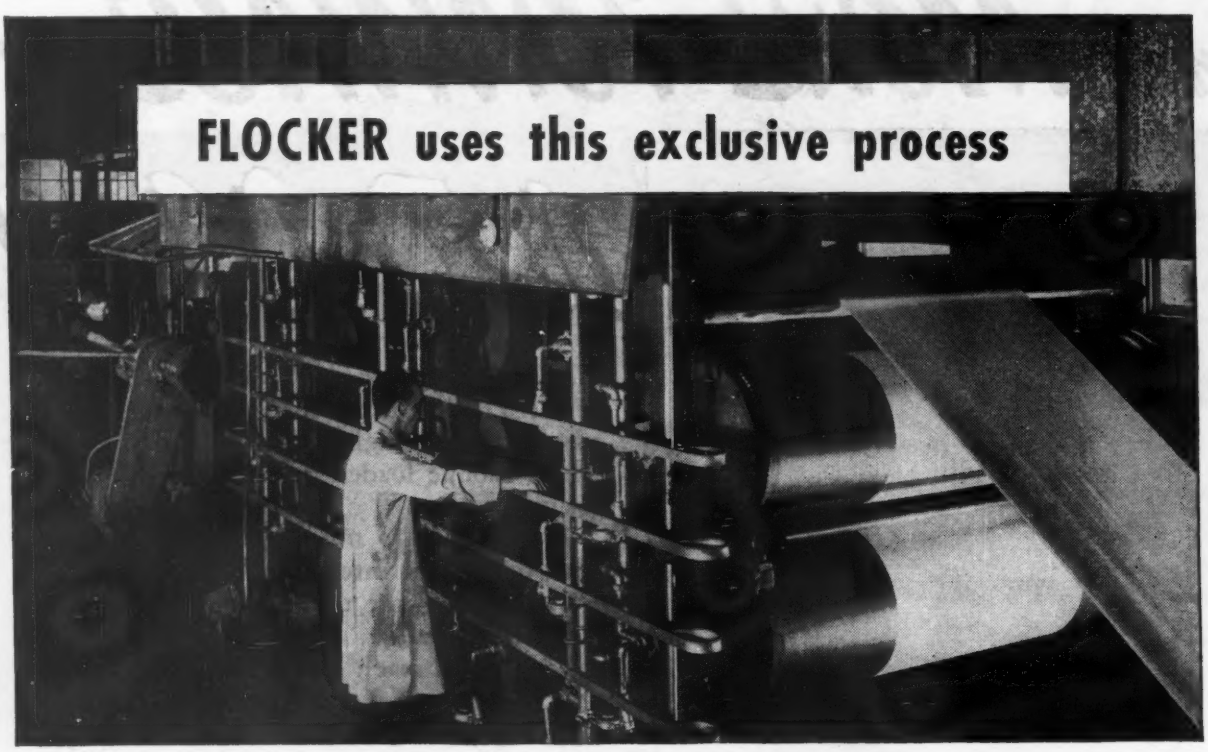
Seattle, Wash. St. Louis, Mo.

NEW! 10-RU Trackless Cutt
Another Sullivan "First"—the only cutter designed 100% for TRACKLESS mining! Ask for NEW CATALOG NO. C-33.
Licensed under patents to E. C. Morgan, No. 1706961, 1706962, 1707132 and 1953325.

IVAN

..established 1851

FLOCKER uses this exclusive process



. . . to give you *better brattice cloth*

Flocker Moropa Brattice Cloth offers greater resistance to fire and mildew . . . stays clean longer and, under identical conditions, outwears the ordinary product.

This all-around superiority is achieved through an exclusive chemical process applied to either Jute or Cotton. The fabric is first saturated with special chemicals, then "can-dried"—a process adapted from the textile field—which thoroughly impregnates and bakes fire and mildew resisting properties into every fiber of the material.

And yet, in spite of its superior qualities, Flocker Moropa Jute Brattice Cloth costs you no more than ordinary Brattice Cloth . . . and prices are only slightly higher on Cotton. In reality, substantial savings can be realized on the use of either type.

If you're interested in the advantages this better Brattice Cloth affords, write for detailed information and quotations.

PROVED SUPERIORITY IN COTTON OR JUTE!

SUPERIOR FIRE-RESISTANCE—Protection lasts almost indefinitely, since chemicals are so thoroughly impregnated that they do not readily leach out.

SUPERIOR MILDEW REPELLENCE—Chemicals used do not absorb excessive moisture and fabric remains relatively dry and repellent to mildew.

STAYS CLEAN—Does not collect mildew "whiskers"—hence no slimy dirt.

LONGER SERVICE—Can be used and reused over and over again. Absence of slime eliminates objections to recovery—men will co-operate in maintaining this Brattice Cloth which so vastly improves their working conditions.

JOHN FLOCKER AND COMPANY

644 GRANT STREET, PITTSBURGH 30, PA.

Since 1822, Ropes, Slings, Nets and Cordage Fittings, Tackles, Waxed and Unwaxed Linen . . . Specialists in Cordage Problems . . . Wire Rope

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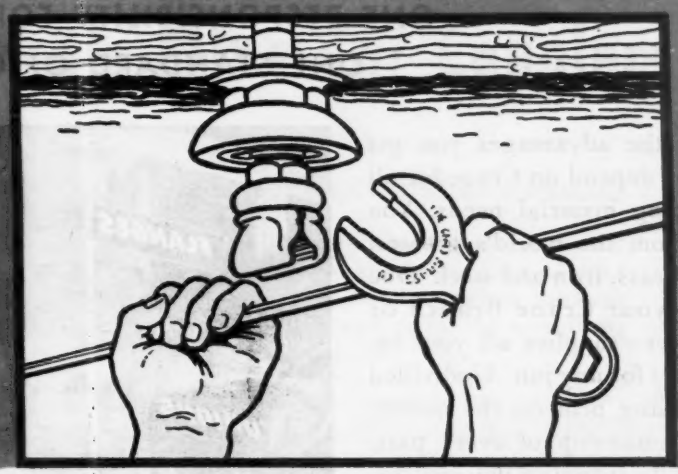
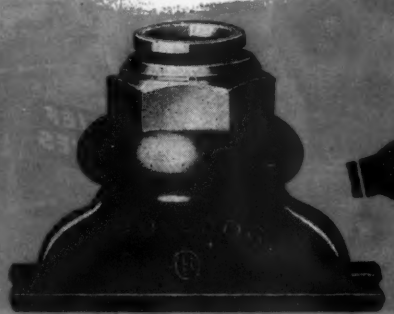
FASTER... SIMPLER...



*O-B BULLDOG TROLLEY CLAMP
Three Sizes Available



*O-B BULLDOG FEEDER SLING
Five Sizes Available

Only One Man Needed to Install Either Trolley Clamps or Feeder Slings . . . Permits More Trolley and Feeder to Be Hung Per Day With Same-Sized Wire Crew.

Put the Famous BULLDOG Principle to Work for You!

Headnut automatically controls opening and closing of clamp jaws . . . Leaves workman's hands free to hold wire in place and tighten head nut.

Catalog Number	for the following Trolley Wire Sizes
14386	0 & 2/0 Round Wire
14387	3/0 & 4/0 Round Wire
14363	0 to 6/0 Grooved, Fig. 8 and No. 9 Section Wire

Catalog Number	for the following Bare Feeder Cables
20292	4/0 to 350,000 circ. mil
14845	500,000 circ. mil
15599	750,000 circ. mil
14846	1,000,000 circ. mil
17012	1,500,000 circ. mil

2561M

Ohio Brass

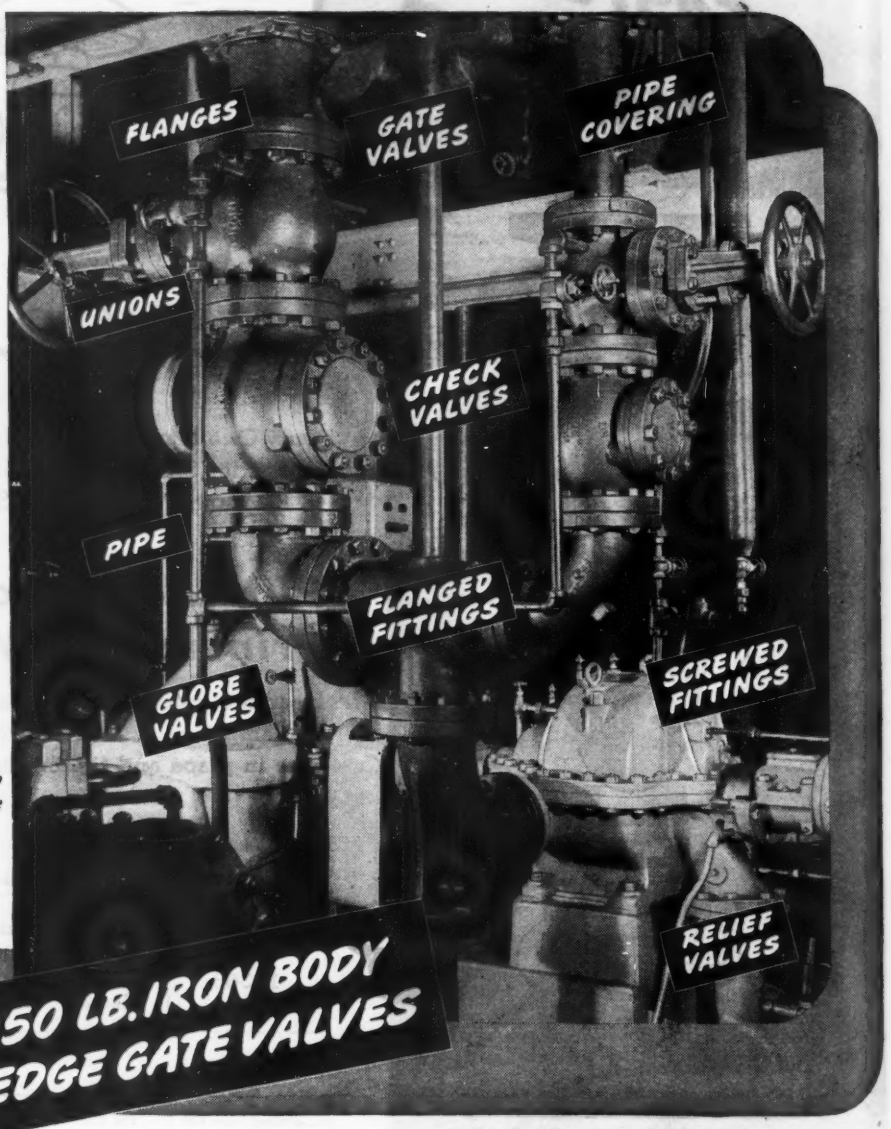
MANSFIELD, OHIO

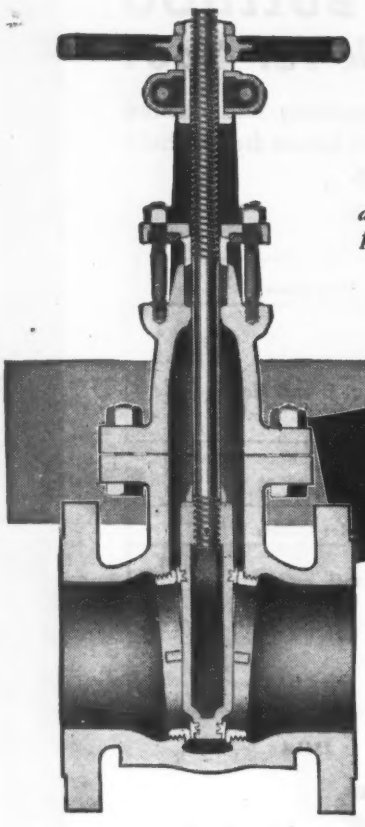
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

CALL ON CRANE . . .
Headquarters for ALL Piping Materials

ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY FOR ALL PARTS
ONE STANDARD OF QUALITY

Look at the advantages you get when you depend on Crane for all your piping material needs. You choose from the world's greatest line—in brass, iron and steel. One source—your Crane Branch or Wholesaler—supplies all your requirements for any job. Undivided responsibility protects the quality and craftsmanship of every part. Thus, while speeding deferred replacements and keeping piping at peak efficiency, you are benefiting by Crane Co.'s 90-year experience in the field of piping equipment.





Pump discharge piping.

SERVICE RECOMMENDATIONS: **Crane 250-lb. Iron Body Wedge Gate Valves** are recommended for services too severe for Standard valves but where the use of steel valves is not justified. Available in all-iron or brass-trimmed; in O. S. & Y. or Non-Rising Stem patterns. With screwed ends up to 4 in.; flanged ends up to 12 in. See your Crane Catalog for complete specifications.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. · *Branches and Wholesalers Serving All Industrial Areas*

CRANE

90 YEARS OF PROGRESS 1855 1945

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

GET THESE FOUR ENGINEERING EXTRAS
With O-B Automatic Mine Car Couplers

POSITIVE INTERLOCK

Movable cam on female coupler head fits into notch on male head, holding it securely within enclosed pocket. Tight interlock protects against both vertical and lateral displacement while coupled.

AUTOMATIC SELF-CENTERING

Sturdy self-contained centering device automatically aligns coupler heads; makes manual alignment prior to coupling unnecessary.

MAXIMUM GATHERING RANGE

Discarding traditional end-for-end design as unpractical for mining service, O-B Coupler Engineers developed male-and-female type coupler heads, providing fifty per cent more gathering range.

UNBREAKABLE, COMPACT RUBBER DRAFT GEAR

Tough, springy rubber buffing pads replace wearable steel springs in O-B's modern draft gear design. Completely enclosed within protective housing, pads will absorb impact blows up to 50,000 lbs. as compared to 12,000 to 15,000 lbs. limit of ordinary steel springs.

O-B AUTOMATIC MINE CAR COUPLERS

Designed Specifically to Meet Mine Operating Conditions

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

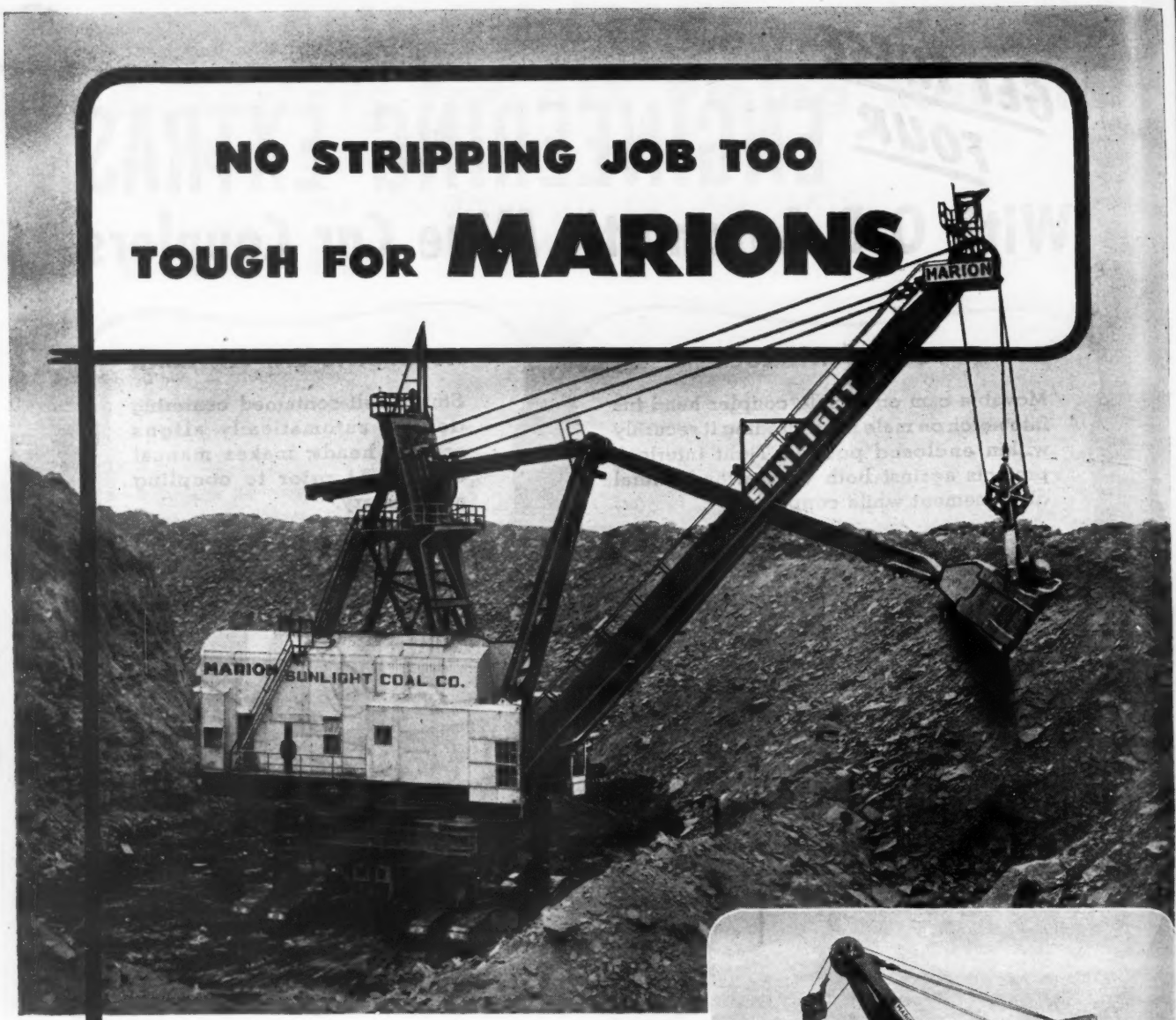
Ohio Brass

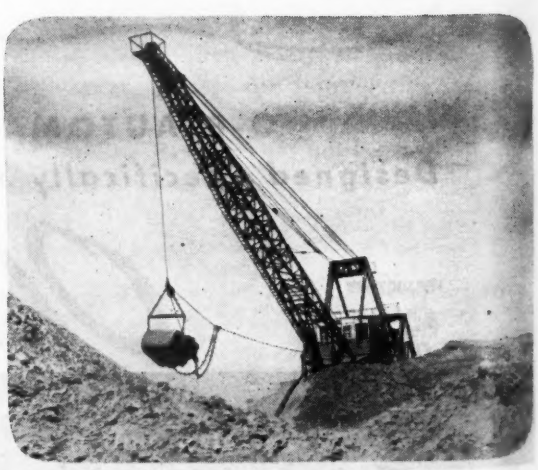
ARMY NAVY E MANSFIELD PLANT

MANSFIELD, OHIO

CANADIAN OHIO BRASS COMPANY, LIMITED, NIAGARA FALLS, ONTARIO

NO STRIPPING JOB TOO TOUGH FOR MARIONS

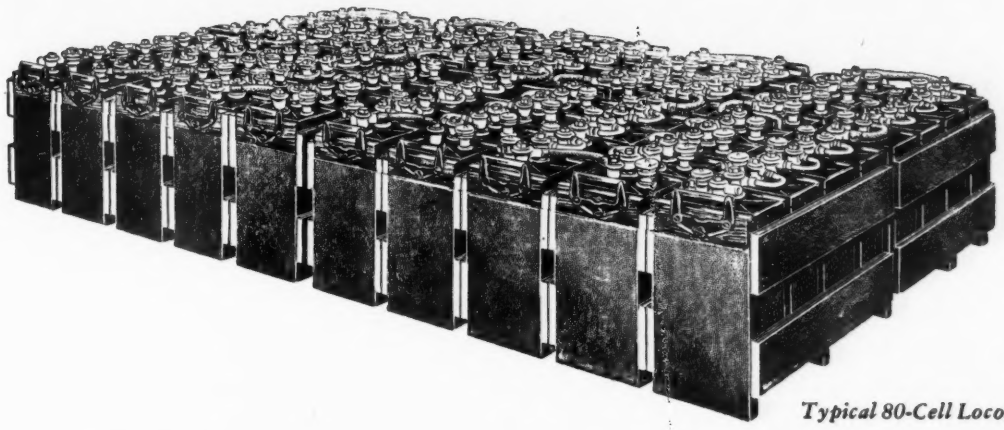




At the Sunlight Coal Company, Boonville, Indiana, 7 MARIONS are working on a twenty-four hour schedule, overcoming unusual stripping problems to keep coal production at its peak. The huge 5561 MARION mastered unusual travel conditions due to unprecedented irregularity of the coal surface, a MARION Walking Dragline eats away at endless overburden at another point in the pit, while MARION coal loaders dig away the 3 to 4 foot coal seam.

What is your coal stripping problem?

THE MARION STEAM SHOVEL COMPANY
MARION • OHIO



Typical 80-Cell Locomotive Battery

WHAT USERS DISCOVER

In Mine Locomotives and Shuttle Cars Alkaline Batteries Give You These Important Advantages

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They can **stand idle indefinitely** without injury, without attention, and without expense.
- They are **simple and easy to maintain.**

Ask a user of Edison Alkaline Batteries what he thinks of them as power units for locomotives and shuttle cars. The chances are he'll say they provide the closest approach to failure-free uninterrupted haulage power he knows of — and are economical, too.

He may at some time have had a wreck — such as a locomotive falling into a shaft or rolling down the side of a waste dump — and found that the battery not only survived with little or no damage but later went on and delivered full service life.

Or, he may have discovered that he can use "worn-out" motive-power batteries for various kinds of lighter-duty standby work for which their capacity is still ample, and thus can get more years of dependable service from them.

As a matter of fact, it is only by actually using Edison Alkaline Batteries that a person finds out how dependable and economical they really are. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

Edison
ALKALINE BATTERIES

20 HEAVY-MEDIA SEPARATION PLANTS
BUILT OR PLANNED FOR IMMEDIATE CONSTRUCTION

Heavy-Media Separation (Sink-Float) plants now operating and planned for immediate construction have a total capacity of over two-million tons a month. Iron, Zinc, Lead-Zinc, Lead-Zinc-Silver, Magnesite, Fluorspar, Tin, Garnet and Coal are now among the minerals to be treated. And continuous-unit testing in the Cyanamid Mineral Dressing Laboratory indicates that many other minerals can be beneficiated by this economical separation process.

With record breaking production causing rapid depletion of higher-grade reserves, many properties are studying the economics of profitable post-war operation on lower-grade deposits. Here Heavy-Media Separation, among all concentration processes, seems to offer the most likely opportunities for worthwhile economies. For instance . . .

In pre-concentrating ores, Heavy-Media Separation may well make sub-ore or waste products commercially treatable; may often effect savings underground by eliminating selective mining; and may also increase the production of concentrates by providing a higher grade feed for the final concentration step.

Heavy-Media Separation is the lowest-cost method of achieving accurate separation of values from waste in a range of gravities which cannot be attained by any other process. In a continuous operation, it makes a sharp separation within ± 0.01 gravity in a range of gravities from 1.25 to 3.40. Plants can be designed to make a multiple-product separation at any pre-selected gravities. Operating in a closed circuit with negligible loss, medium costs are low. Ores too low-grade to be treated by any other method can be beneficiated economically by Heavy-Media Separation.

Ore Dressing Notes #13, describing Heavy-Media Separation with particular reference to coal cleaning, will soon be ready for distribution. Ore Dressing Notes #14, describing Heavy-Media Separation plants now beneficiating metallic and non-metallic ores, is in preparation. Copies of either or both will be sent without obligation.

AMERICAN CYANAMID COMPANY

30 Rockefeller Plaza, New York 20, N. Y.

IN EVERY SERVICE U.S. TIRES EXCEL!

Today new tires are scarce. First call must go to our armed forces—you wouldn't have it any other way. That's why it's so important to make every tire mile count—by getting the *right* tire for every job—by giving your tires the kind of care they need to deliver *all* their built-in service. U.S. Heavy Service Tires are built to make every tire mile count. They are compounded and engineered to excel at their specific jobs. See your U.S. Truck Tire Dealer today. Ask him about U.S. Transportation Maintenance. He can help you keep your truck tires rolling.

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Serving Through Science

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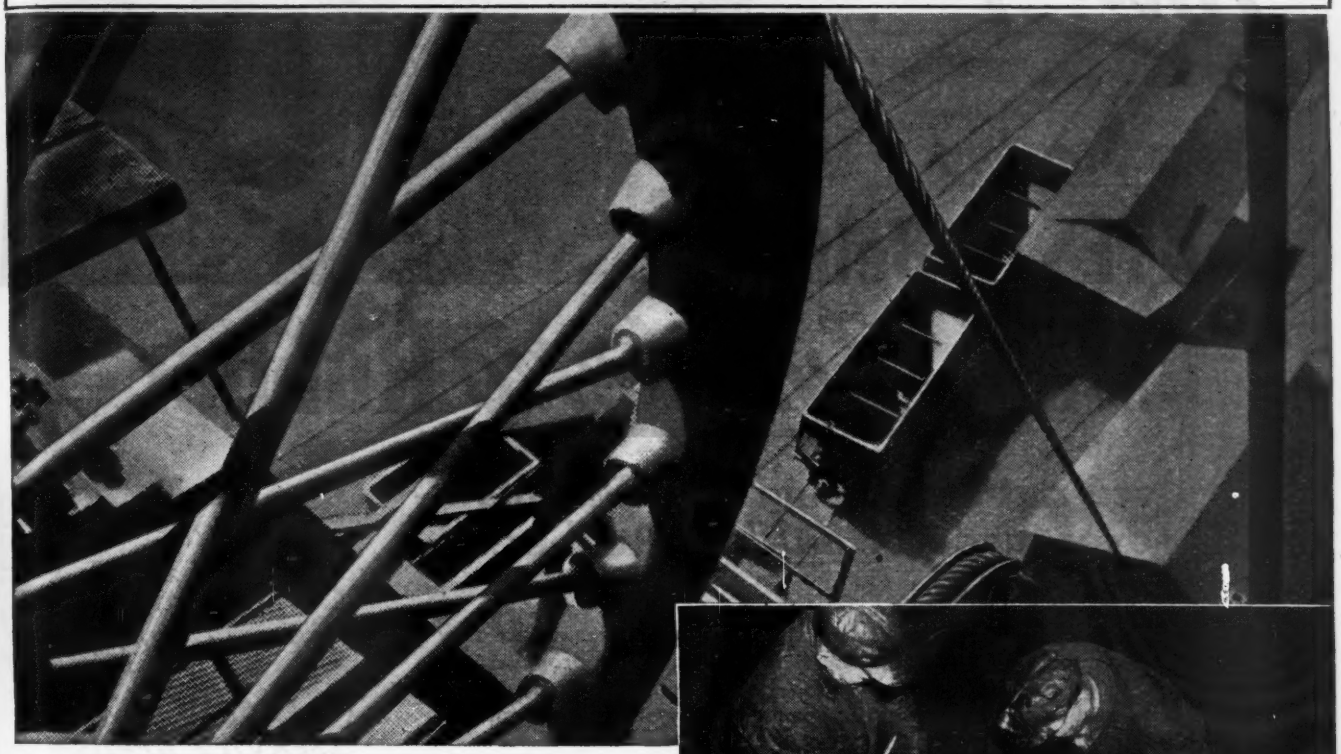
A Bethlehem Specialty . . .

BIG, STURDY ROPE *for* MINE SHAFTS



When you rig your shaft hoist, your first thought is to get the best rope that it's possible to buy. That means Bethlehem, for mine-shaft ropes have always been given particular study by Bethlehem metallurgists and rope-makers.

Stresses due to acceleration are frequently high . . . and load, depth of shaft, and speed of operation must all be carefully considered. It certainly is a case where "any old rope" won't do. The making of the rope should be entrusted to a builder who's an old hand at the business.

Bethlehem does its own designing, makes its own steel, draws its own wire, and fabricates the wire into strands and ropes, every step being under the supervision of experts. The making of its big, husky shaft rope is directed by men who know mining and mining problems. That's why, when your reel is stamped "Bethlehem," you can rig your hoist with complete confidence.

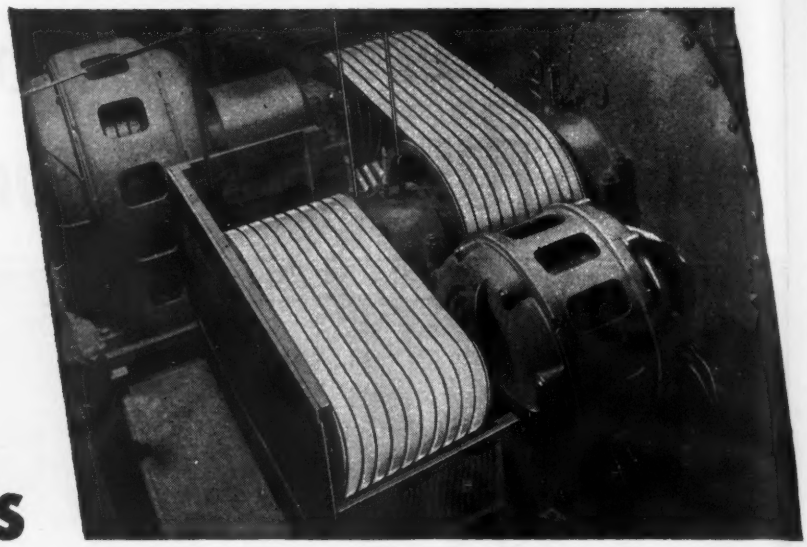
For extra protection, the Lay-Lock clamp is recommended in combination with Bethlehem shaft-hoist rope.

In a shaft rope, vibration and fatigue stresses concentrate at the cage socket. As an additional safeguard, the Lay-Lock clamp is bolted to the rope several feet above the cage, and heavy chains connect the clamp to the cage itself. Normally these chains carry no load. They function only in case of emergency.

Among Lay-Lock's outstanding advantages are the molded inserts which fit tightly around the contours and lay of the rope. These inserts are of zinc that has been poured while molten around a section of the rope to be used. Thus, when the zinc has solidified, it provides a positive grip, each wire and strand fitting snugly into a definite, molded channel.

When you think WIRE ROPE . . . think BETHLEHEM

Today-



Your *Standard*
GATES V-Belts
—Made of *Synthetic* Rubber—

are out-performing *ANY* V-Belts ever made of *NATURAL* Rubber!

No V-Belts built by *anyone* before the war could stand the service now daily delivered by Gates V-Belts on army tanks, tractors and self-propelled big guns. Gates developed these greatly superior V-Belts through intensified, specialized research—and Gates is building these belts entirely of *synthetic rubber.*

This fact is now important to YOU — — and here is the reason:

● **Every improvement developed by Gates for these Army V-Belts has been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.**

In the case of many *other* products, as you know, you must wait until after the war to get the benefits of war-time improvements. But victory depends so directly upon production and production so directly upon V-Belts which drive the producing machines, that Gates has been able to give you *immediately,* in your Standard Gates Vulco Ropes, every V-Belt improvement which Gates specialized research has developed for use in the Army's motorized equipment.

In addition, where V-Belts of special construction are required, your Gates Rubber Engineer is in position to supply a Gates V-Belt that is precisely engineered to meet your special needs.

Whatever drive problem or V-Belt problem you may have, you need only to pick up your phone book and look under the heading "Gates Rubber." The Gate Rubber Engineer will bring right into your plant the full benefits of every advance in V-Belt construction and in drive operation that Gates specialized research has developed.

NOTE: GATES ALSO MAKES THESE SPECIAL BELTS TO MEET EXCEPTIONAL SERVICE NEEDS-

- Rayon Cord V-Belts
- Static-Safety V-Belts
- *Special* Synthetic V-Belts
- Cotton Cord V-Belts
- Steel Cable V-Belts

Gates

The Mark of Specialized Research

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GATES VULCO ROPE DRIVES

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3-CAR PACKAGED POWER

Car No. 1—all the a-c equipment
Car No. 2—the transformer
Car No. 3—the Ignitron Rectifier and the d-c equipment

THE AIR-COOLED TRANSFORMER IS

One

IMPORTANT REASON WHY

Two

OUT OF EVERY

Three

MINE OPERATORS CHOOSE

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

IGNITRON EQUIPMENT

Development of the Westinghouse Type ASL *Air-Cooled Transformer* was a major step forward in the safety of underground equipment. Since no cooling liquids are required, fire and explosion hazards are eliminated. This is one of the important reasons why two out of every three users of portable equipment choose the Westinghouse Ignitron Rectifier train.

Space is another important consideration. The Westinghouse Air-Cooled Transformer occupies less than two-thirds of the space required by a liquid-filled transformer. This makes it possible to provide a small, compact, three-car unit . . . light in weight and easy to handle.

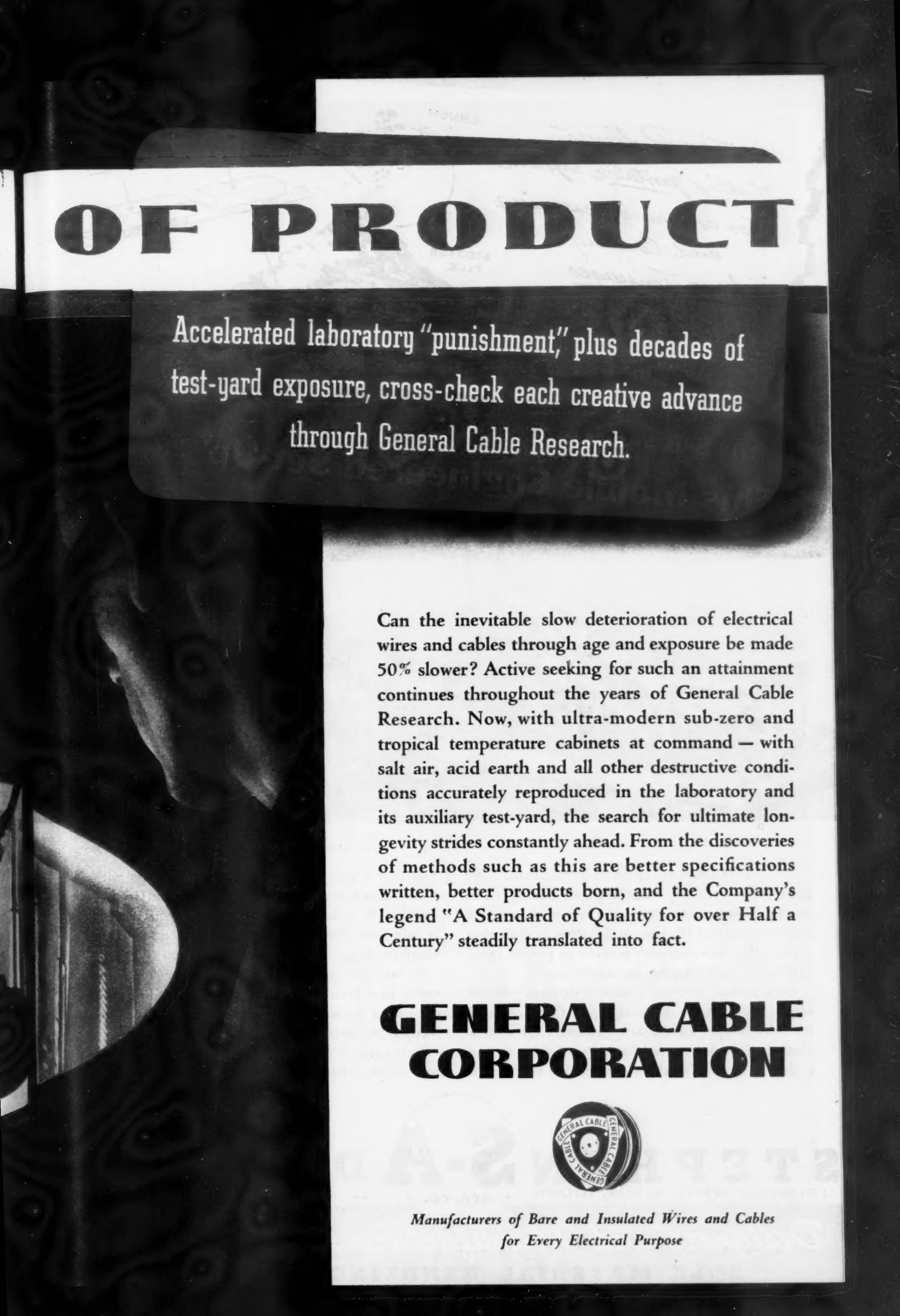
Ignitron portable power units are now in use on all types of heavy-duty service in coal, iron, zinc, copper and salt mines. They are ideally suited for mining use. Dust, dirt, fumes, heat, dampness or condensation have no effect on the operation of the air-cooled transformer. For complete information about Ignitron Rectifier Equipment, call your nearest Westinghouse office. Or, send for booklet B-3492 illustrated below. Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-94668

This new booklet gives the full story of the portable Westinghouse Ignitron Rectifier. It contains the specifications of the four standard sizes built today—200, 300, 400 and 500 kw. Write today for your copy.

ELECTRICAL EQUIPMENT FOR THE MINING INDUSTRY

LONGEVITY

Here, the moisture-permeability of a synthetic is tested in the "Weatherometer", a device which accurately measures the relative time-resistance of various insulating materials to the most damaging elements of weather:—ultra-violet rays, wind, moisture.



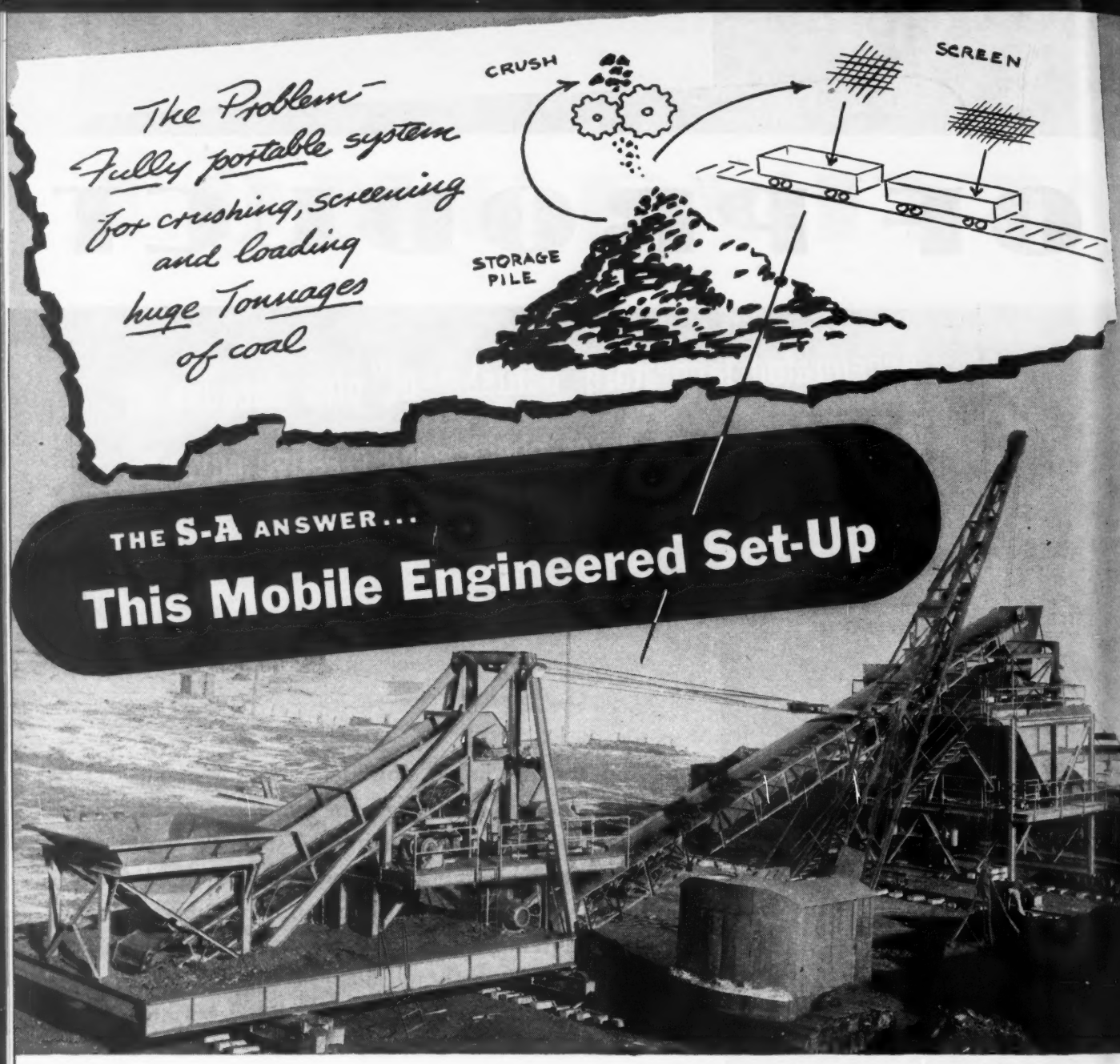
OF PRODUCT

Accelerated laboratory "punishment," plus decades of test-yard exposure, cross-check each creative advance through General Cable Research.

Can the inevitable slow deterioration of electrical wires and cables through age and exposure be made 50% slower? Active seeking for such an attainment continues throughout the years of General Cable Research. Now, with ultra-modern sub-zero and tropical temperature cabinets at command — with salt air, acid earth and all other destructive conditions accurately reproduced in the laboratory and its auxiliary test-yard, the search for ultimate longevity strides constantly ahead. From the discoveries of methods such as this are better specifications written, better products born, and the Company's legend "A Standard of Quality for over Half a Century" steadily translated into fact.

GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose



THE S-A ANSWER...

This Mobile Engineered Set-Up

View showing the crushing, the screening and loading units. Each unit is fully portable. The plant can easily handle upwards of 6,000 tons per day.

• An efficient system to handle three basic operations—crushing, screening and loading—is in itself a complex job. But in the system shown, S-A engineers carried efficiency still further in designing a plant that was *completely portable* to permit rapid shifting to meet varying day-to-day needs.

Let's follow coal as it moves through various stages, beginning at the storage pile. Coal is loaded into the hopper of the S-A Crusher Unit with a clam shell bucket . . . fed by a Pan Feeder to the Crusher . . . moved to the S-A Screening Unit on an S-A Belt Conveyor . . . loaded into rail cars with twin Boom Conveyors, or into trucks from Hopper underneath screening unit. Each of the two units is fully portable, and can be shifted to provide complete flexibility of the plant.

In addition, a large portable S-A Stacker Conveyor (*not shown*) does triple duty, feeding the crusher or the screening plant or loading coal directly from storage to rail cars.

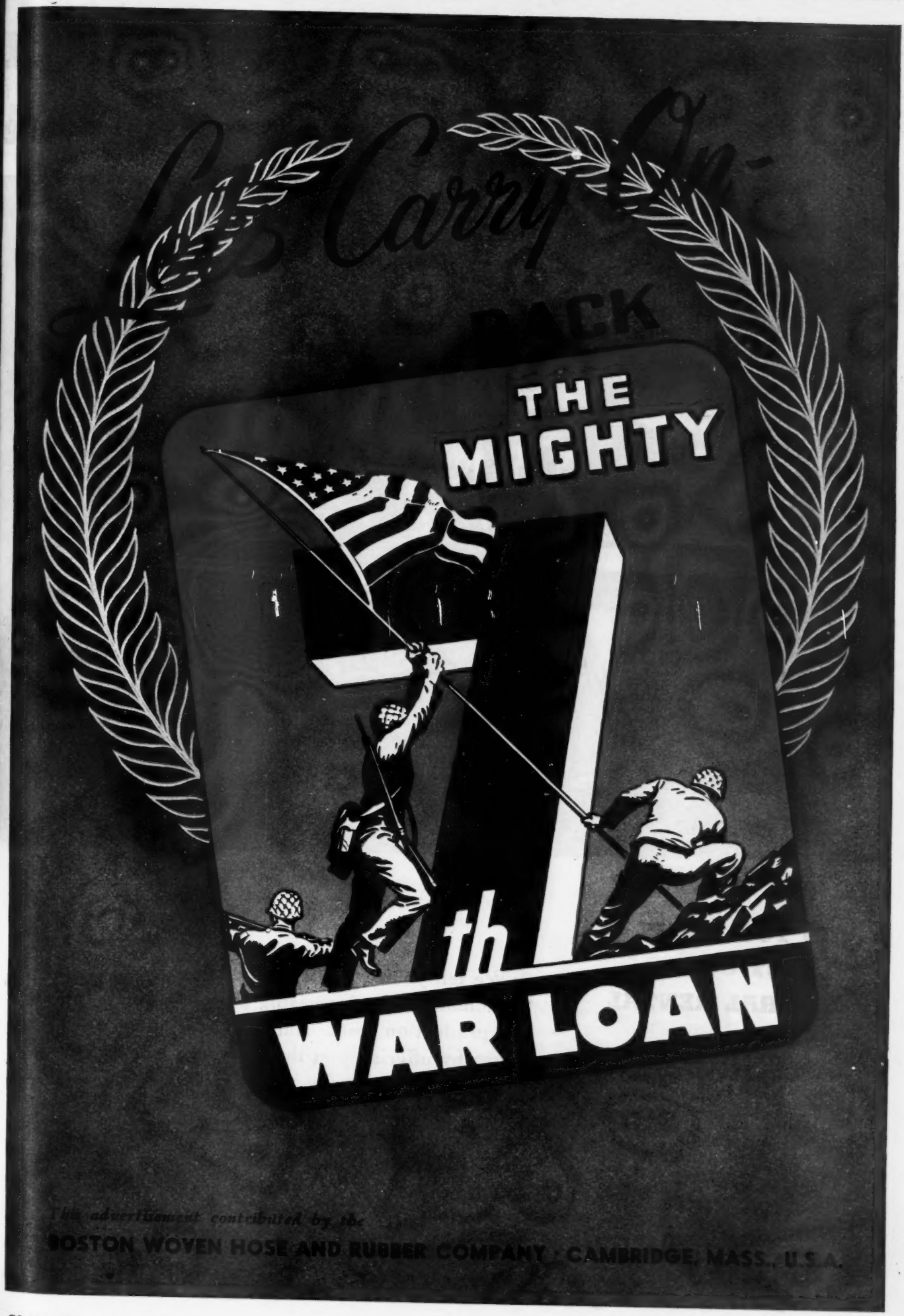
Here again, it's S-A all the way—engineering plus equipment—that resulted in maximum efficiency.

STEPHEN S-A ADAMSON MFG. CO.

2 RIDGEWAY AVENUE, AURORA, ILLINOIS — LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

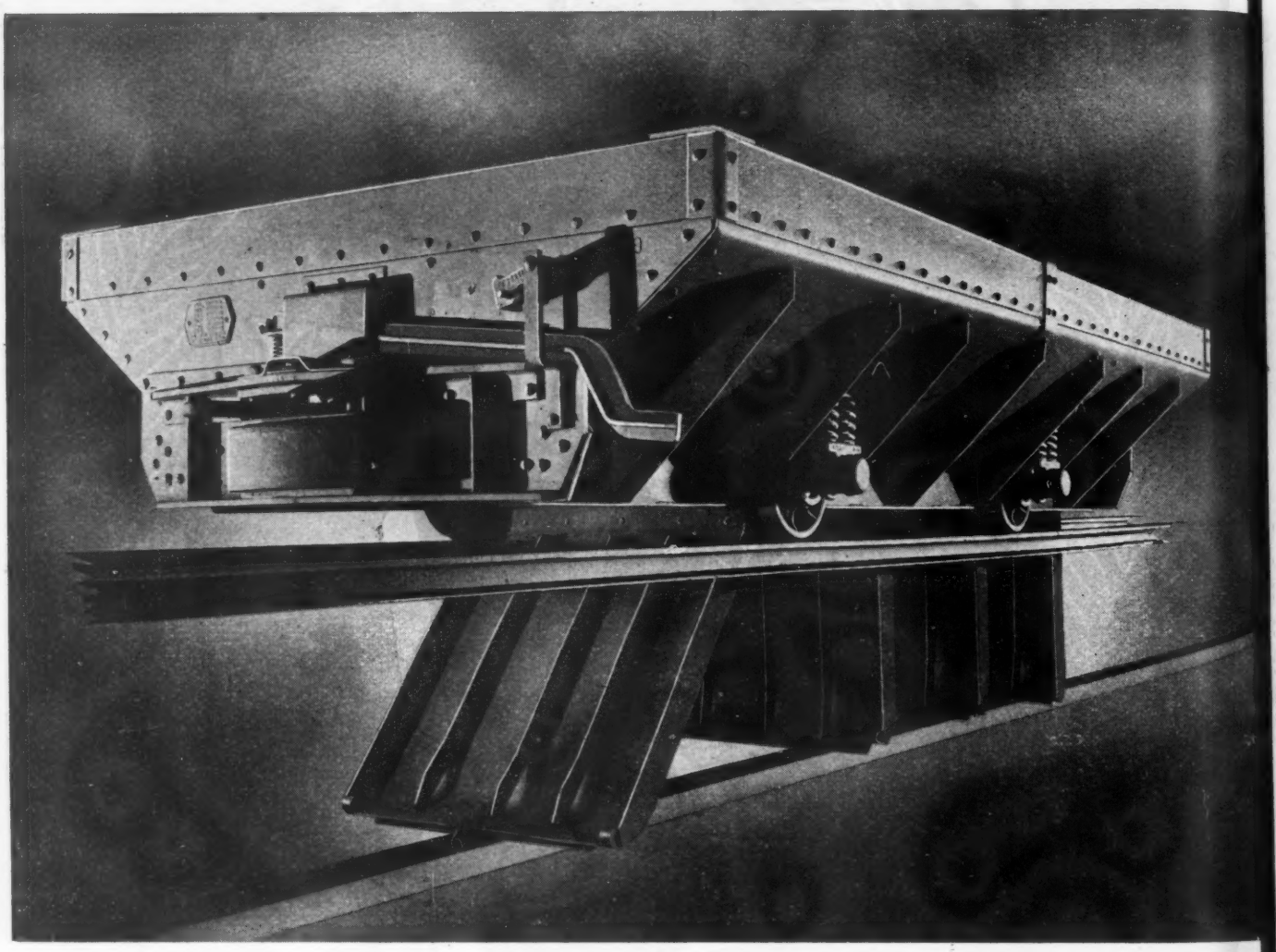
Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT


Let's Carry On-
BACK
THE
MIGHTY
th
WAR LOAN
This advertisement contributed by the
BOSTON WOVEN HOSE AND RUBBER COMPANY · CAMBRIDGE, MASS., U.S.A.

★ If You Want 'em WIDE . . .

—Take a Glimpse At



DO YOU KNOW ABOUT OUR LIBERAL RENTAL PLAN?

★ We tell you of the many advantages of S-D 1-2-3 "Automatics" for increasing production and for cutting production costs. But we go all out to back our claims by offering you these cars on a liberal rental plan. A plan whereby your savings will more than pay the rentals. A plan with an option to purchase the cars at anytime, should you later prefer to own them. You can't lose. Why wait? Write for full details now.

Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

If You Need BIG CAPACITY . . . At This S-D 1-2-3 "Automatic"!

★ Here is another of those S-D 1-2-3 "Automatics" that make the mines that use them so successful.

This car, shown on these pages, is built for standard 56½ inch track gauge. It is approximately 9 ft. wide, 18 ft. 6 in. long, 42 in. high, and it will haul about 12 tons of coal each trip. The illustration below, with the eight men perched across the car, will give you a good idea of its extreme width.

The first forty of these S-D 1-2-3 "Automatics" were delivered to a new mine, for operators who know from experience the many advantages of S-D 1-2-3 "Automatics" in assuring maximum tonnage at minimum cost per ton.

There just isn't any other car made that can equal the efficiency of the S-D 1-2-3 "Automatic." Case after case of change-over installations prove this. And, the men in the mines who handle and load the cars like S-D "Automatics."

It makes no difference about the size. We build these remarkable mine cars in any capacity to suit your particular requirements. And, regardless of size, every S-D "Automatic" is so designed to give you minimum dead weight, and, at the same time, ample margin beyond the actual structural requirements for hard service and long life. This is why S-D "Automatics" have long been noted for their ability to take the punishment of hard service down through the years.

Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

Fireworks ON WHEELS

Marine fireworks on bloody Iwo Jima, as pyramids of projectiles rain death on Japanese emplacements. Rocket launchers are mounted on International four-wheel-drive trucks. —Official U. S. Marine Corps Photo by S/Sgt. Rex M. Robbins.

AMERICA bounced back hard in this war against the Japs, and the boys who led the rebound were *United States Marines.*

From Guadalcanal to Okinawa the Marines have proved that boys from Kokomo, the Ozarks and the Bronx—when steeped in Marine Tradition, skilled with Marine training—are doggone good fighters. On beachhead after beachhead—then in jungle after jungle—they were far outnumbered by the Japs. But not outfought!

On they go, those Marines, on land and sea and in the air . . . outsmarting, outshooting, outkilling the enemy . . . till the Japs say "Uncle."

They have good equipment, sure. Most of the thousands of trucks they use, for example, are International four and six-wheel-drive military type vehicles built especially for the Marine Corps.

But proud as we are that Harvester has been able to make equipment rugged enough to fight with the Marines, we know that the real fighting machine in this march to Tokyo is the Marine himself. What a machine! All speeds forward . . . none reverse. Tough . . . rugged . . . smart. A superlative fighter. A superb citizen.

We proudly salute the boys from Kokomo, the Ozarks and the Bronx, who are *fighting* up to their glorious motto—Semper Fidelis.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

The War Bonds You HOLD Are FIGHTING BONDS . . . Support the Mighty Seventh War Loan

INTERNATIONAL *Trucks*

WHY A CUMMINS DIESEL ?..

In making a decision on the diesel you'll want for your heavy-duty mining operations—hauling, stripping, loading or stationary—consider *all* the "angles" . . . the men who build it . . . use it . . . service it.

More than 26 years of manufacturing experience devoted wholly and exclusively to diesels are represented in the modern Cummins Dependable Diesel . . . your assurance of the most advanced design and construction.

The list of Cummins Diesel owners includes many of the best-known and most successful operators in the mining industry . . . your assurance that Cummins Diesels have long been doing the very job you want done.

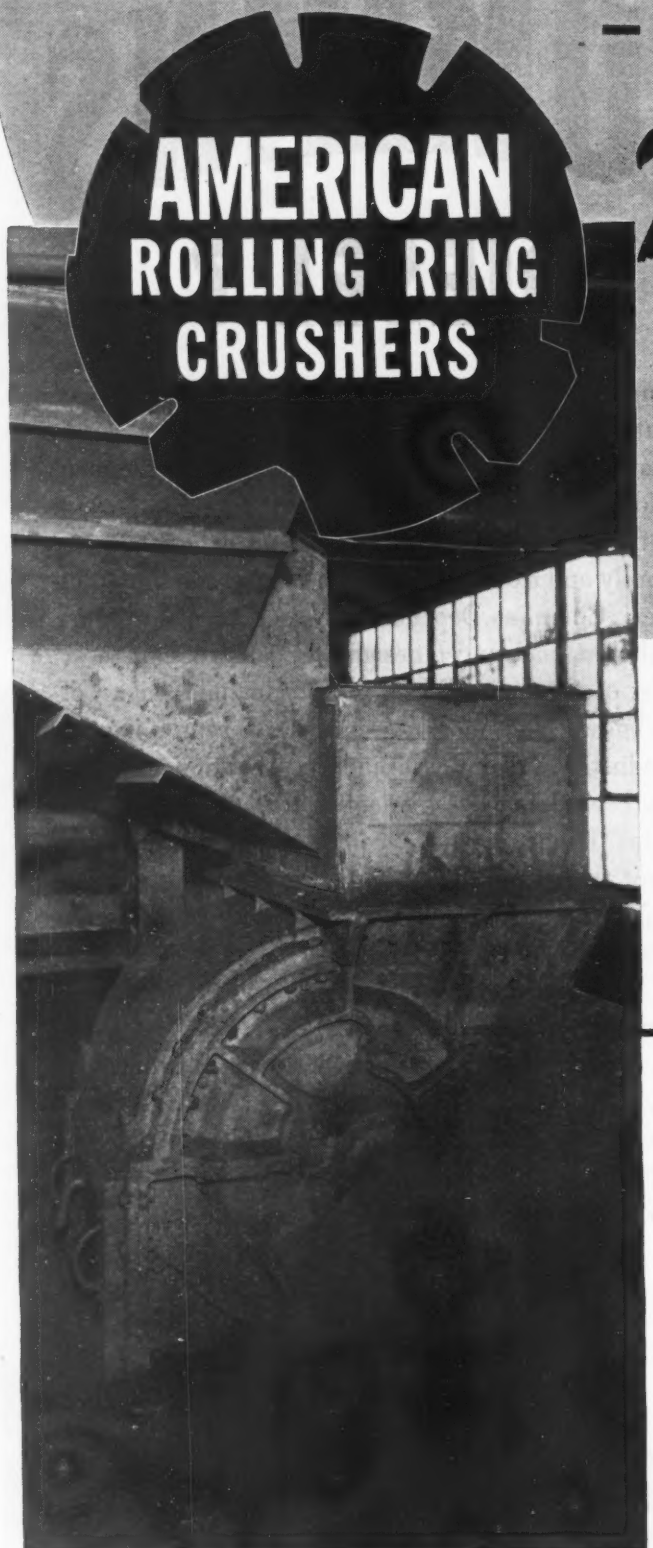
Cummins Dealers provide complete service facilities throughout the nation. They know the engine and know how to take care of it . . . your assurance that your Cummins Diesels will never be far from competent *Cummins Service.*

Built by men who are *diesel specialists* . . . the choice of men who demand the best in power . . . backed by dealers who fully appreciate the importance of service . . . these are the reasons why Cummins Dependable Diesels are your most profitable investment in power.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

AMERICAN ROLLING RING CRUSHERS

—BETTER QUALITY *Results* AS YOU INCREASE CRUSHING TONNAGE



★ Speed up the production of stoker and pulverized coals — get uniform size — get day after day exceptionally low costs as greater tonnages come through. The simple and modern answer to such results is the American Rolling Ring Crusher. Here is equipment that is giving top performance in many mines and we show you actual results from numerous locations.

The splitting action of the SHREDDER RINGS shatters and distributes the coal before it reaches the Breaker and Grinding Plates.

These patented reversible manganese steel SHREDDER RINGS are found only in the American Rolling Ring Crusher. They have twenty cutting edges or teeth and are designed to maintain their outward position by centrifugal force at the specified speeds. In contact with solid metal, the rings are momentarily deflected from their usual course because they are free to swing back out of position. There are no shear pins or other safety devices that require attention.

To investigate now is to find out the immediate way for you to improve your coal production.

If we find that a standard unit isn't exactly fitted to your production needs we arrange an American Rolling Ring Crusher that is fully adequate—of course the American standard and proved efficient design is a basic factor regardless of size or type we produce.

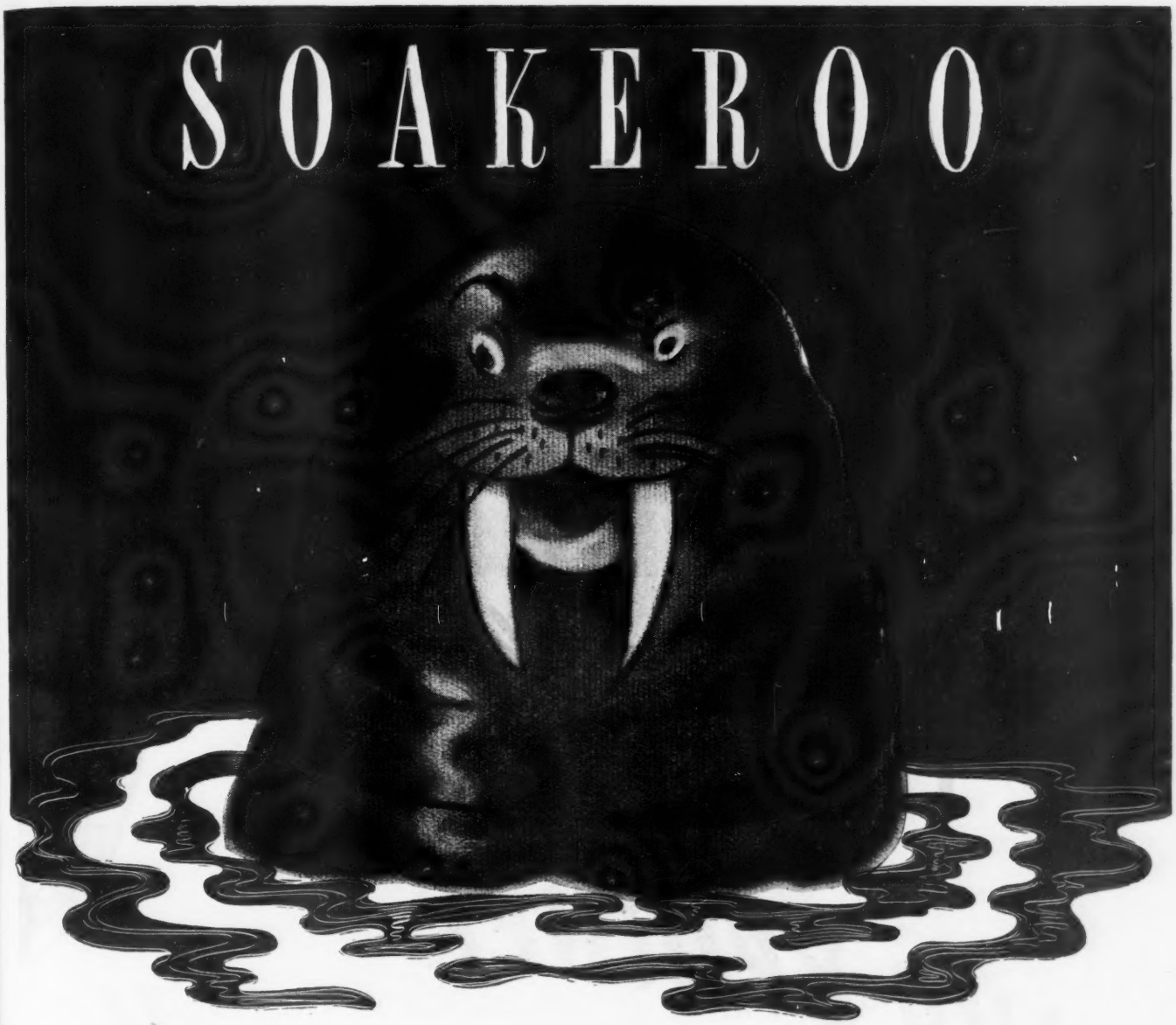
☆

- *Greater Range of Reduction*
- *Uniformity of Size.*
- *Crushing at Less Than One Cent a Ton*
- *Extreme Simplicity of Operation*
- *Externally Adjusted*
- *Easily Accessible — Compact*

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, 10, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

SOAKEROO



Like the hide on the amphibious old fellow above, the jacket for U.S. Royal Mining Machine and Locomotive Cables is tough and waterproof. It has to be to give the service mine engineers expect when they specify "U.S. Royal".

We make sure of it by submerging these cords and cables, hour after hour, in a bath that is a real "soakeroo". You could safely use them if your mine was at the bottom of the ocean!

Rough treatment is the rule for a whole series of tests our scientific inspectors make of U.S. Royal Cords and Cables. They are heated, frozen, compressed, stretched, bent. And they have to pass with a mark of 100%. That's why they have all the qualities you need . . . no matter how tough the conditions are at *your* mining property.

THE NEW U. S. ROYAL *Safety Tested*

MINING MACHINE AND LOCOMOTIVE CABLES

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon, 3:00 to 4:30 E.W.T.

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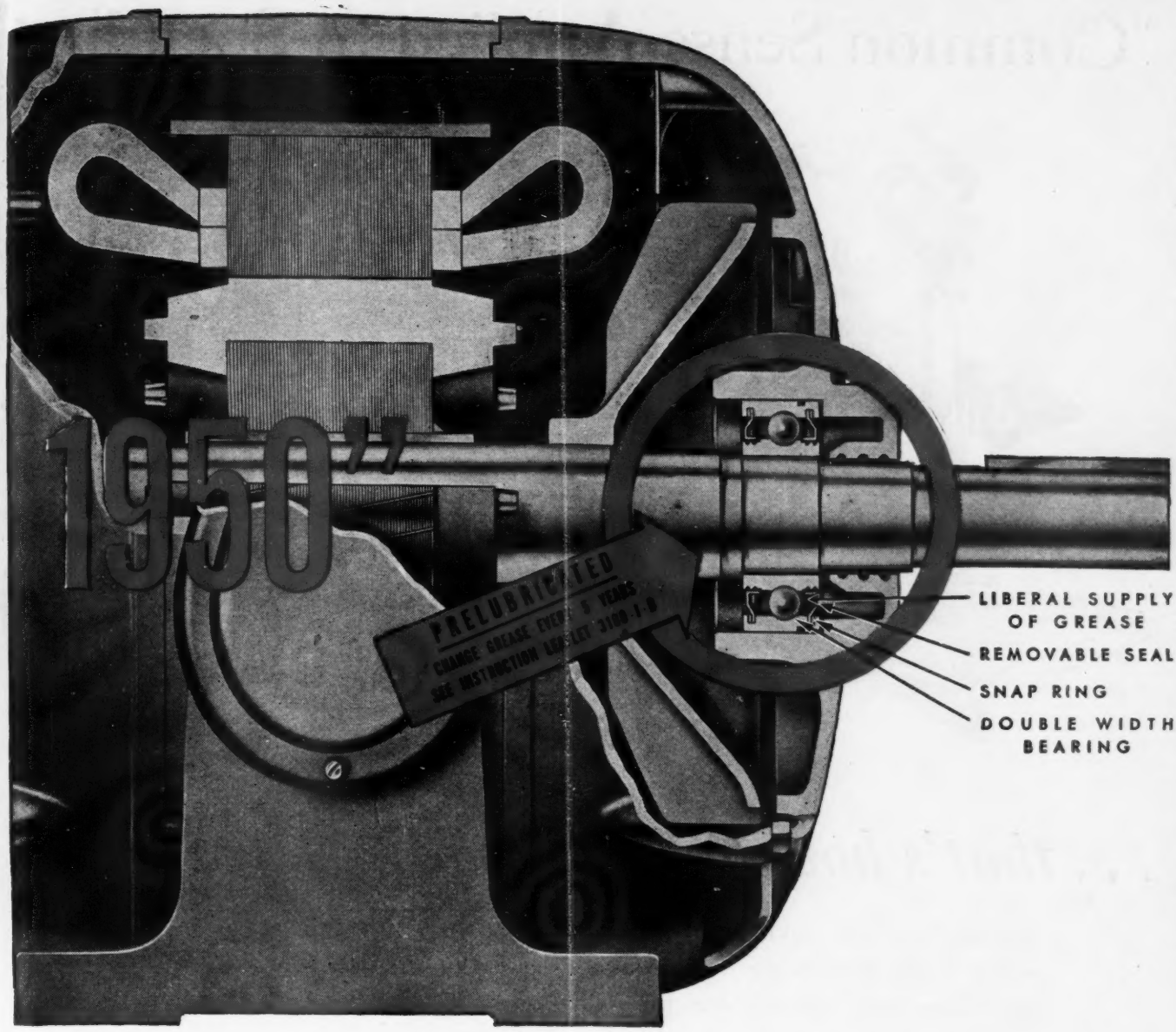
in describing their new

TYPE CSP MOTORS

AND BROTHER
THEY AIN'T KIDDING!!

Bearings by NORMA



The performance of NORMA-HOFFMANN DOUBLE-WIDTH PRELUBRICATED "CARTRIDGE" BEARINGS in actual field service over the past eight years emphatically supports this statement.

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HOFFMANN

NORMA-HOFFMANN BEARINGS CORP'N. STAMFORD, CONN. *Founded* 1911

Field Offices: NEW YORK • CHICAGO • CLEVELAND • CINCINNATI • PITTSBURGH • DETROIT • LOS ANGELES • SAN FRANCISCO • SEATTLE, WASH.

"Common Sense Applied to Spending"

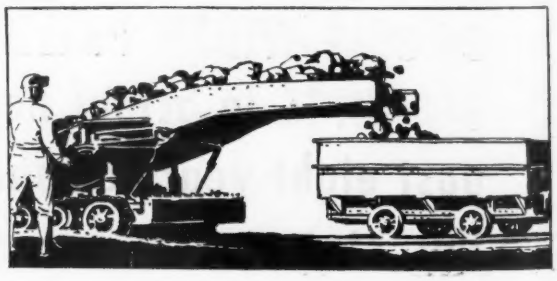
. . . that's how to buy explosives, too

Buying hats and buying explosives have one thing in common —the wrong purchase is no bargain. Price is not the first consideration; it is "what it does for you" that really counts.

Efficient blasting insures quality coal. It increases production—gets more work out of your equipment. Poor blasting is hard on the loader and makes crushing slower and more expensive.

Good Blasting Makes Money—
Poor Blasting Loses Money

Your Atlas Representative is an experienced blaster. He has 25 permissibles at his command—backed by years of company experience on the best way to use them. Put that "know how" to work for you. It will help you produce *real* operating economies.



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

GRAVITY

REPLACED THE BODY HOIST. . . . .

You can't have body hoist trouble with the Dumptor, because the Dumptor has no mechanical body hoist. Gravity does the dumping. Touch the release lever and the weight of the load tilts the scoop-mouth body almost 90 degrees. Dumping is instantaneous. Empty, the body swings back to the loading position — also by gravity.

KOEHRING COMPANY
MILWAUKEE 10, WISCONSIN

Ask for your Dumptor Catalog today.

Order Now FOR POST WAR DELIVERY

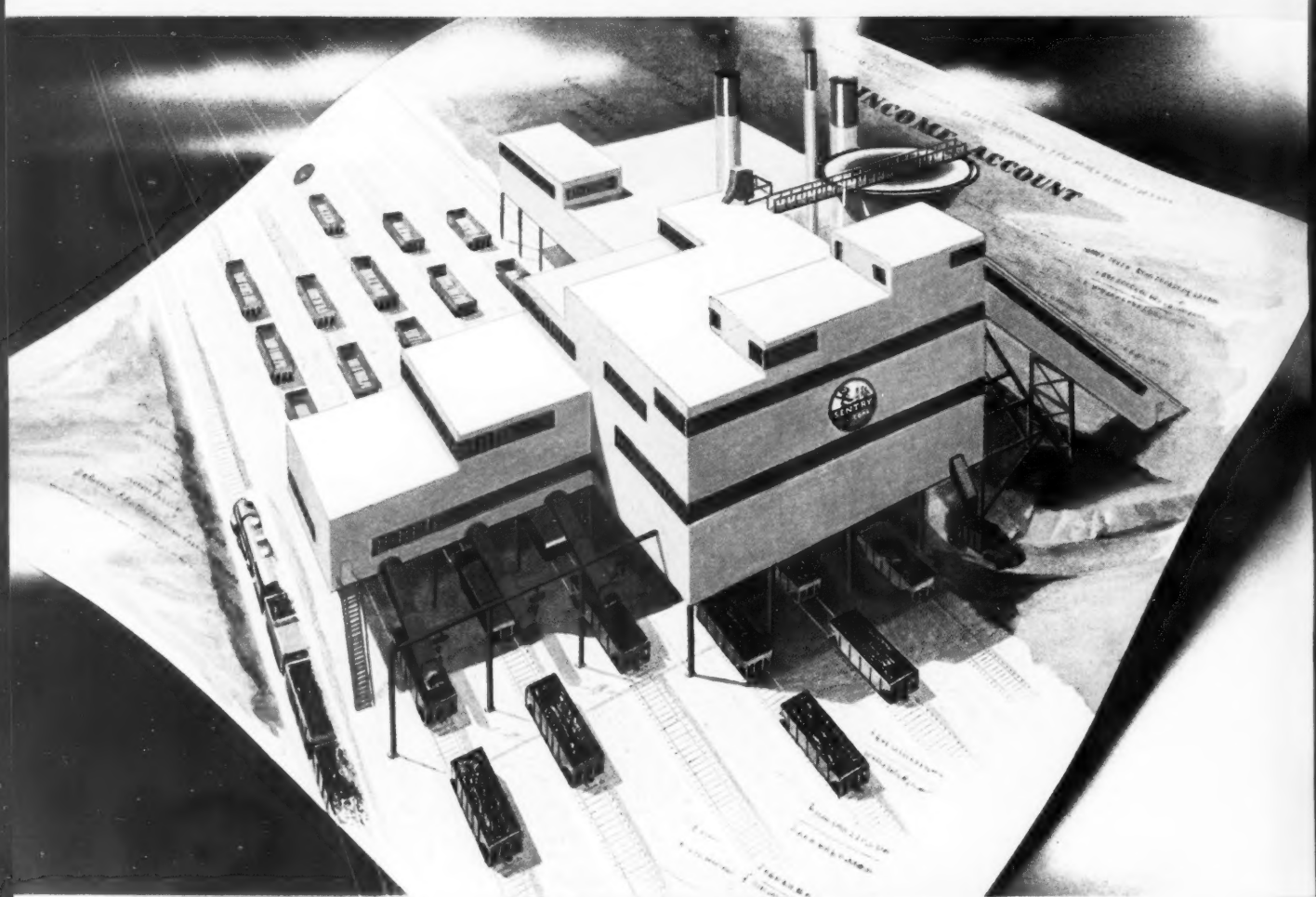
ARMY E NAVY

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Custom Built Plants—

. . . that's why there are seldom two plants exactly alike



. . . ***and without exception***, each of these preparation plants, devoted to the production of specification fuel through washing, drying, and grading, is on the profit side of the income account.

Men of vision in charge of production and executives are responsible for the building of such plants with the result that mines, often unpromising as to raw coal, are developed into mines producing highly efficient specification fuel, worthy of premium prices. That's how satisfactory profits are made in the coal mining business.

Laboratory tests of your raw coal in our laboratory, is the first step toward turning coal into specification fuel. If these initial tests indicate that your coal has possibilities for fuel in the premium price class, our technical staff can assist you. They will design and erect a plant for your specific needs.

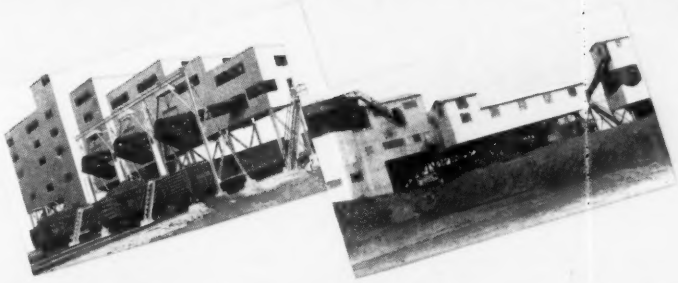
The services of this technical staff are available to you . . . anywhere in the world. Let us assist you in the proper preparation of *your* product, so that you can get a market now . . . and stay in that market for all time to come.

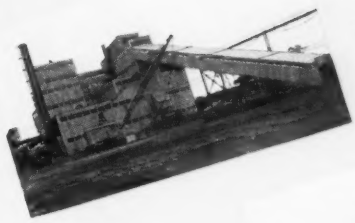
McNALLY PITTSBURG

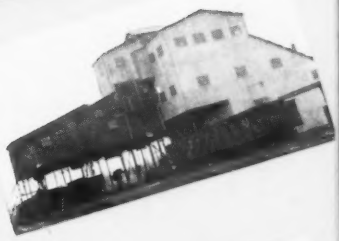
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

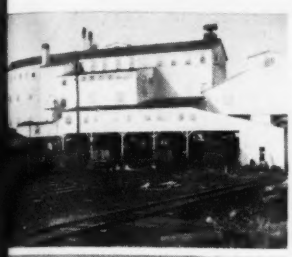
McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill. • Pittsburgh 19, Pa. • Caixa Postal 1310, Rio de Janeiro, Brazil

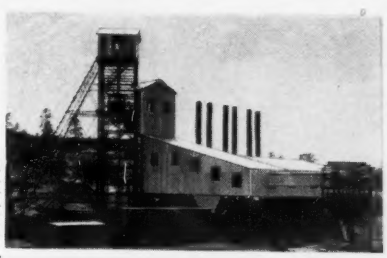
TO MEET INDIVIDUAL NEEDS

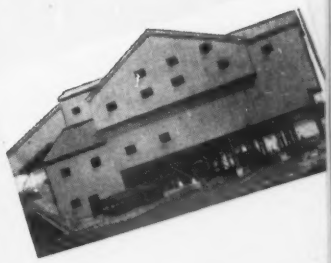


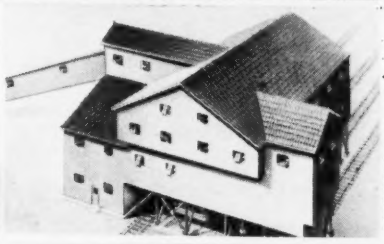


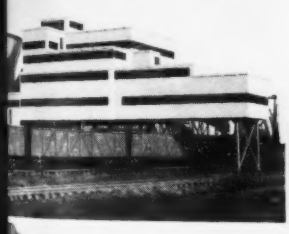


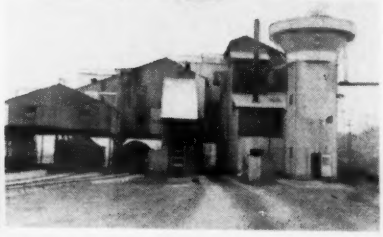


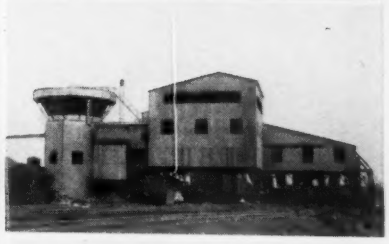




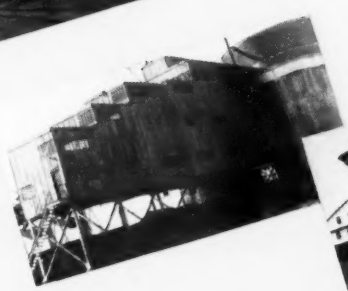


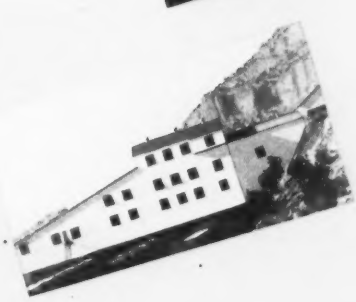






FROM 100 TONS PER HOUR TO 1000 TONS PER HOUR. NO PLANT TOO LARGE OR TOO SMALL FOR US TO DESIGN AND ERECT.





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ARMY-NAVY PRODUCTION AWARDS
1st award... July 20, 1943
2nd award ..Jan. 20, 1944
3rd award...July 20, 1944
4th award....Feb. 17, 1945

PMCO

ALL PURPOSE

- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

AMERICA'S MOST COMPLETE LINE OF MATERIAL HANDLING BUCKETS

● **WE BUILD A WIDER AND MORE COMPLETE LINE OF MATERIAL HANDLING BUCKETS THAN ANY OTHER MANUFACTURER.**

See your shovel engineer or equipment dealer about PMCO dippers and buckets.

● **WE ARE THE WORLD'S LARGEST BUILDER OF WELDED SHOVEL DIPPERS**—sizes ½ yd. to 18 yds. In certain sizes our volume exceeds that of all other manufacturers combined.

● **EXPERIENCE COUNTS**

Pettibone Mulliken Corp.

"Quality Since 1880"

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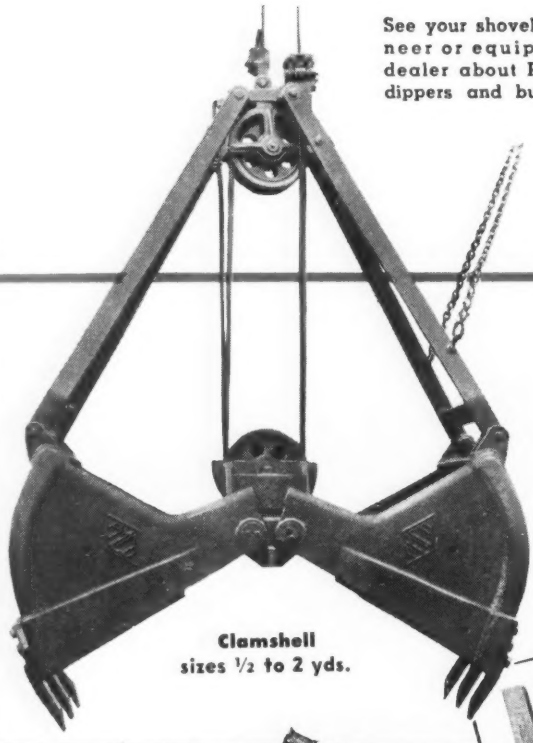
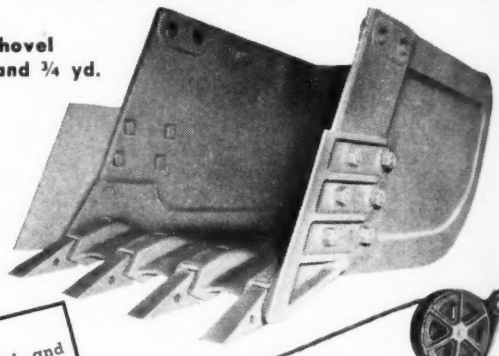


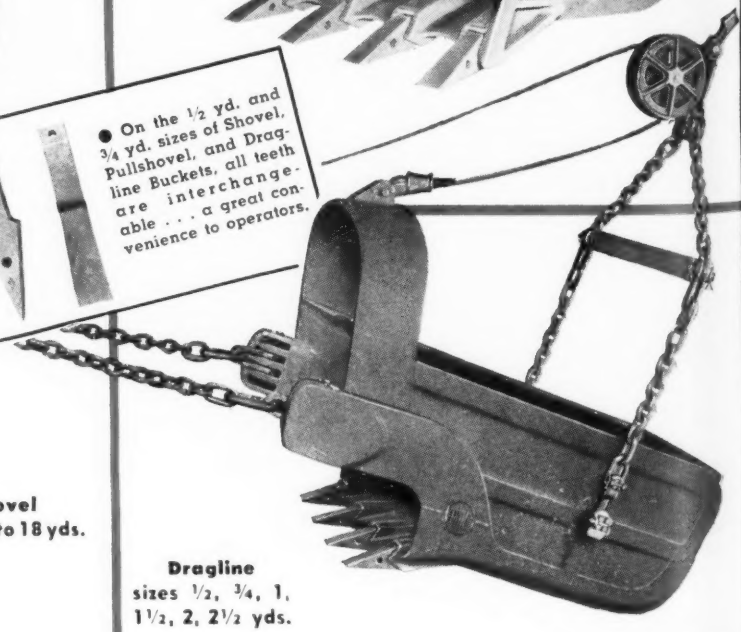
Clamshell
sizes ½ to 2 yds.

Pullshovel
sizes ½ and ¾ yd.



● On the ½ yd. and ¾ yd. sizes of Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable . . . a great convenience to operators.

Shovel
sizes ½ to 18 yds.



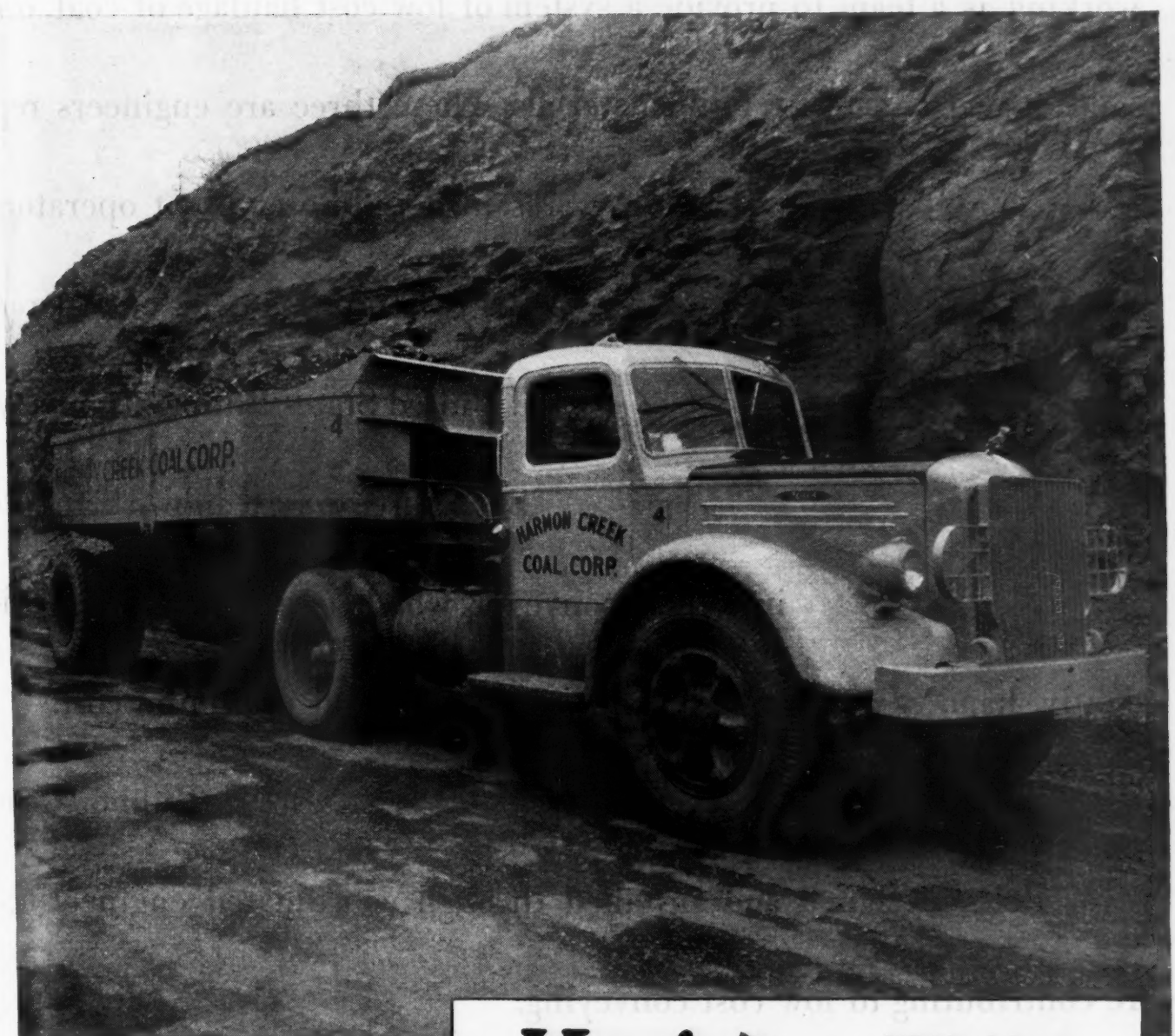
Dragline
sizes ½, ¾, 1, 1½, 2, 2½ yds.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

16 tons . . . 40 mph . . . 2000 tons per day!

WHEREVER YOU find a job of tough, heavy hauling going along fast and easy, you'll usually find a Mack. The reason? Simple. Mack trucks are built to be the *best* in the world. Performances *prove* the success of that aim!

The Harmon Creek Coal Corporation operates a fleet of seven Macks in the Pittsburgh coal area. These trucks average 2,000 tons a day on a 7-hour day basis. Where mine road conditions permit, these rugged Macks haul their 16-ton payloads at 40 miles an hour! An amazing performance, yes, but day after day routine for Mack. Because you've got *more* truck, you get *more* work from a Mack!



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Mack Trucks, Inc., Empire State Building, New York, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS

FOR EVERY PURPOSE

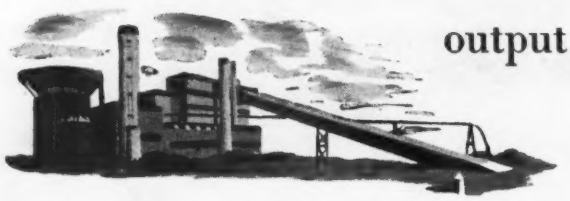
ONE TON TO FORTY-FIVE TONS

NEW Mack Trucks are available for essential civilian use. Ask for details.

WHAT IS COORDINATED CONVEYOR ENGINEERING?

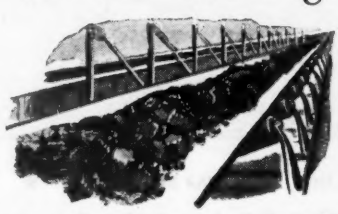
Simply this: three separate engineering staffs working as a team to provide a system of low cost haulage of coal, ore, sand, gravel and other bulk materials. These three are engineers representing: mine or plant operators, conveyor equipment manufacturers and United States Rubber Company.

Such three-way teamwork results in a belt conveyor which carries materials efficiently, handles



output at minimum cost.

Thousands of U. S. Rubber Conveyor Belts, designed and installed through coordinated engineering, are contributing to low cost conveying.



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Giant "eggs" for our bombers require frequent handling before they are dropped on the enemy. Juggling heavy bombs is one of the vital everyday tasks which our men must perform . . . and one in which tough, dependable wire rope is important.

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If you have a wire rope problem our wire rope engineers will be happy to help solve it. Just write Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, N. Y.

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"Know Your Ropes" contains 82 pages of suggestions on proper selection, application and usage of wire rope. This easy-to-read, profusely illustrated manual can save you money . . . and save wire rope for the war fronts. Send for your free copy now.

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The shaded area in the graph below shows the *excess capacity* of the Kathanode battery. From beginning to end of service life it is greater than that of ordinary batteries.

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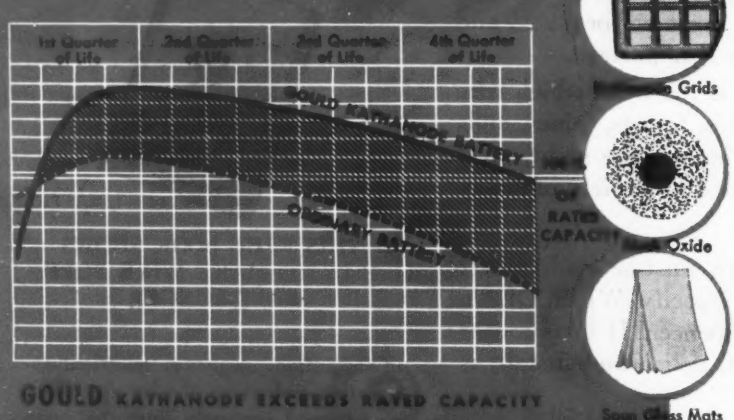
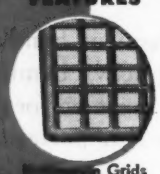
Write Dept. 106 for Catalog 300 on Gould Kathanode Glassklad Batteries for Mine Shuttle Car Service.



GOULD KATHANODE EXCEEDS RATED CAPACITY

KATHANODE FEATURES



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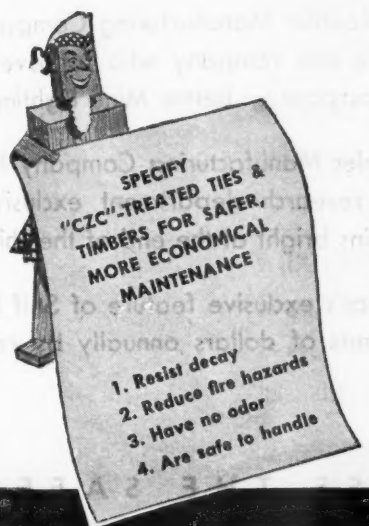
Can safety and economy go together?

Failure of an untreated post *from decay after one year. The post on the left was placed at the same time but was treated with CZC.*



THE BOOKLET, "Wood Preservation for Mines," tells how you can save money on mine ties and timber and increase safety at the same time.

It includes photographs and charts giving comparative facts and figures on life expectancies of untreated timber and lumber that has been pressure impregnated with CZC (Chromated Zinc Chloride) to resist decay and reduce fire hazards.

Learn these facts *now*. Then when you need or can get new timber, you'll be ready to use CZC to your best advantage. Fill out and mail the coupon below today.

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BETTER THINGS FOR BETTER LIVING
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Tim Malloy says...

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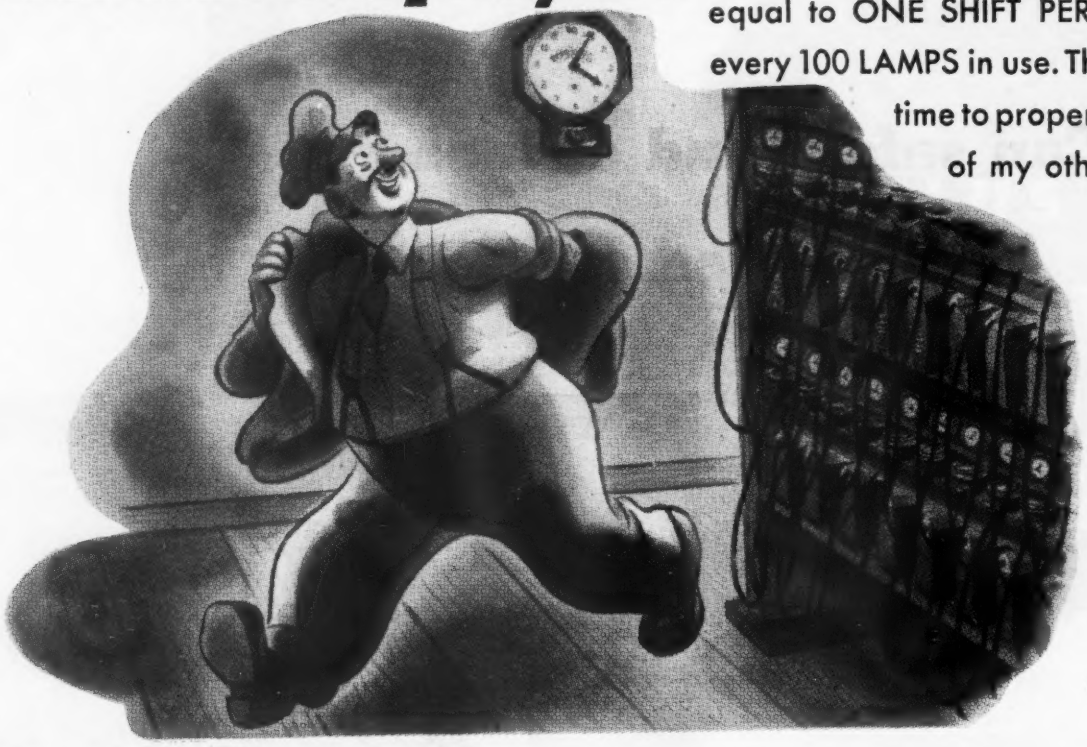
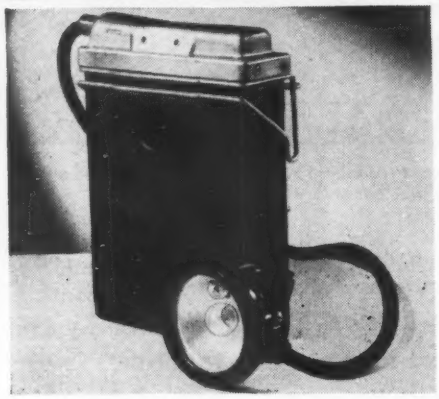
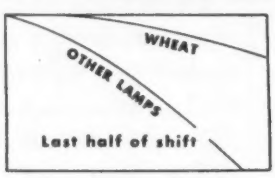


WHEAT *the approved cap lamp*





Wheat burn brighter at end of shift

1. It is SAFE — Two bulbs — if one is broken, miner is never in the dark. Rubber battery case — non-conductor of electricity. Battery solution harmless to a healthy skin.
2. It is DEPENDABLE — The Koehler Manufacturing Company and Wheat Lamp Sales, Inc. are one company who for over thirty years have had a single purpose — Better Mine Lighting.
3. It is EFFICIENT — The Koehler Manufacturing Company has devoted its laboratory and research department exclusively to perfect a lamp which remains bright at the end of the shift.
4. It is ECONOMICAL — Wheat's exclusive feature of Self Service saves the operator thousands of dollars annually by reducing mine operating costs.

WHEN YOU USE WHEAT YOU USE THE SAFEST!

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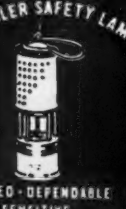

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WHATEVER the type of job, or type of maintenance, to get the best—specify Rochester . . . over-specification in every grade and size . . . and available in increasing quantities as government demands ease off.

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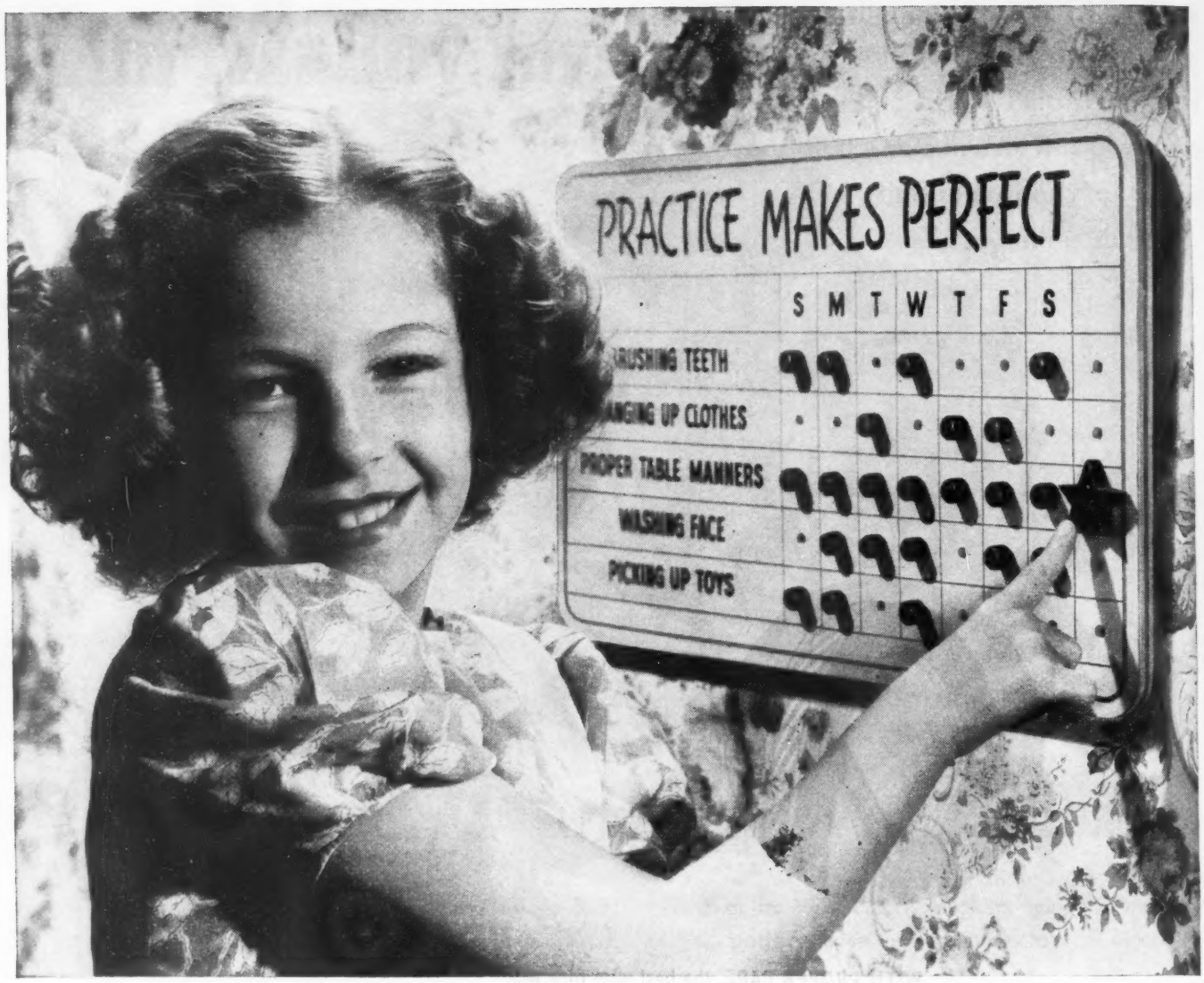

Rising Star

The habit of constantly TRYING leads to the habit of SUCCEEDING, as every parent—and every businessman—knows. It is this "habit of trying" . . . and succeeding . . . on the part of Hewitt's rubber engineers that has led to so many advancements in rubber for industry . . . that led to Hewitt's successful development of SYNTHETIC compounds 14 years ago . . . at a time when they were just a "gleam in the eye" of most manufacturers now producing them.

This priceless "plus" of constantly trying . . . of usually succeeding . . . means industrial rubber products designed to DO your job BETTER . . . do it LONGER . . . COST LESS per working hour.

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Save MAINTENANCE TIME

THE *Iron Valve* WITH *Bronze* WHERE IT'S NEEDED

If you want to reduce valve maintenance time on lines where frequent cleaning and inspection are required—specify Walworth Fig. 709, the bronze-mounted Iron Body Saddle Style Wedge Gate Valve.

Easy to take apart because of its U-bolt body-to-bonnet connection, this valve permits quick inspection, easier cleaning, and rapid re-assembly, and can be repacked under pressure in either the open or closed position. It is recommended for general use on steam, gas, gasoline, water, oil, and process lines, and is especially suited for lines carrying sludge, fluids of high viscosity, or mixtures which might have a tendency to clog under the disc or between the valve seats.

Walworth Fig. 709 is made with bronze wedge, seat rings, stuffing nut, gland, bonnet bushing, stem and stem nut. The bonnet and body are made of cast iron. Two drain holes located inside the bonnet permit the line fluid to drain off when the valve is open, thus eliminating the danger of serious damage due to freezing. This valve is furnished with either screwed or flanged ends, in sizes from ¼" to 4".

All Iron Valve

For services where line fluids are corrosive to bronze trim, Walworth offers Fig. 711, an iron body valve which has malleable iron wedge disc and stuffing nut, and steel gland and rising stem. This valve is available in sizes from ¼" to 4" (Screwed), and 1" to 4" (Flanged).

For further information on these Walworth Valves—and details on Walworth's complete line of valves and fittings—write on your company letterhead for a free copy of Catalog 42.

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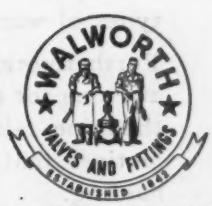
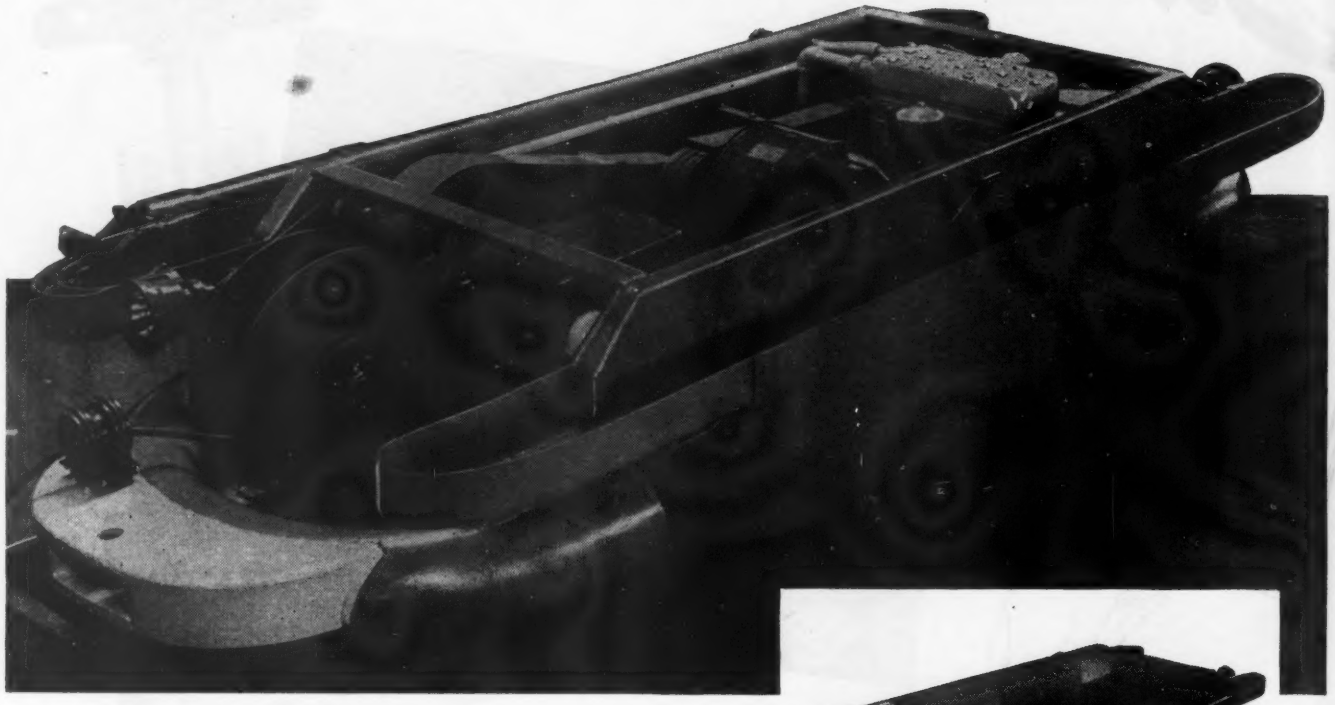


With this Cantrell Compressor you get a 2-TON LOCOMOTIVE too!



The Cantrell, Type SP is More Than a Dependable Air Compressor

The Cantrell Type SP Compressor is shown above. Its height is only 26 in. above rail. Length 12 ft. 6 in. Complete protection of all operating parts, from rock, slate or dirt falls is provided by removable steel top.

• To investigate the use of the Cantrell, Type SP, Air Compressor in any mine means to learn that it is rapidly becoming a standard, indispensable piece of mining equipment. No longer is it necessary to waste time and expense of men and locomotives in moving your compressor from place to place.

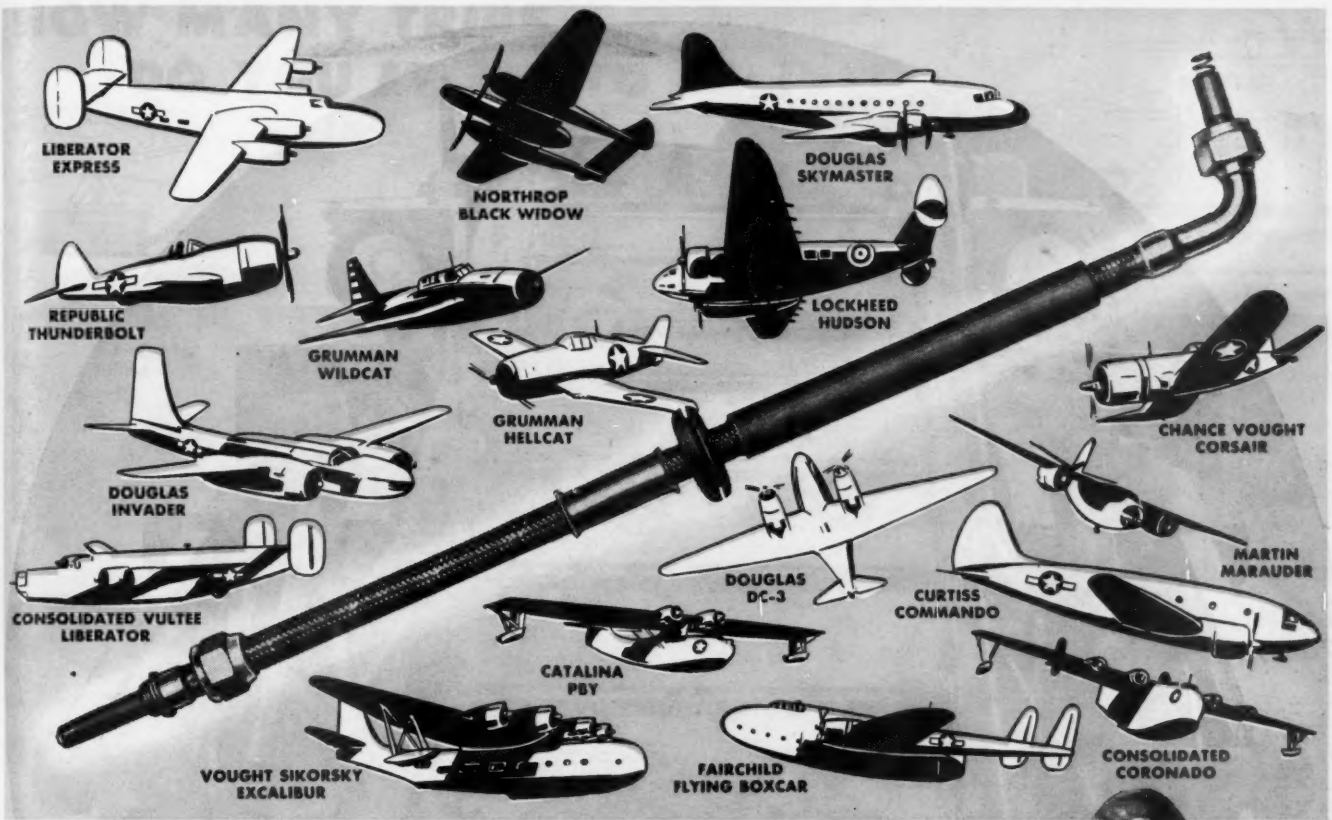
The Cantrell SP is an independently operated compressor. It is self tramming in itself, and in addition, serves as a locomotive in pulling cars for hauling crew and equipment from place to place, in all types of work.

Furthermore, the Cantrell SP is available anytime for quick transfer of cars within the mine, taking the place of costly locomotives that may be needed for heavier hauling.

Here is a compressor that has proved its superior dependability in hard service for all air compressor service. Its self-propelling feature has proved its indispensability for faster, more economical operation.

The Cantrell SP is so essential in your mine for conserving manpower . . . so necessary for so many services, we know you cannot well afford to be without it. Let us give you the complete story. Write now to Imperial Bronze Manufacturing Co., Jellico, Tenn.

Cantrell COMPRESSORS



"We're Adaptable – We Like Tough Problems," says Romey

Early in 1942 Titeflex Inc., of Newark, N. J., asked Rome Cable engineers to develop, along with its Newark laboratory, the UNIMOLD AIRCRAFT IGNITION LEAD, although this development was divorced from Rome's customary products—copper wires and cables.

Thus was designed and perfected an integrally molded lead that provided quicker starting, longer life, fewer repairs and safer flights for our nation's warplanes, through improvement of the nerve center of the plane—namely, the ignition system. All types of planes shown above use UNIMOLD.

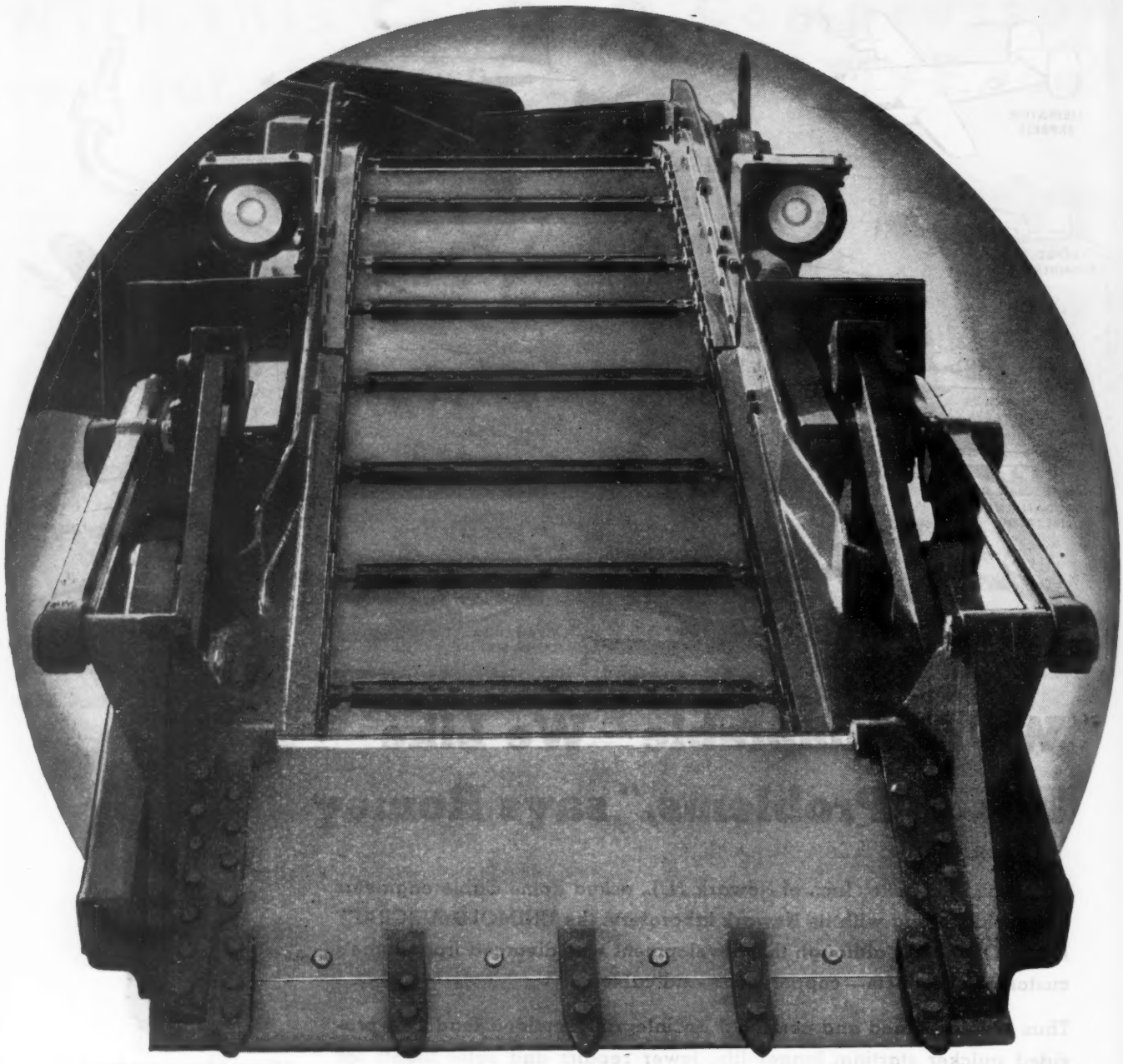
What Rome Cable did for one customer—Titeflex—and our country in wartime, we can do for other customers in peacetime. We welcome both your problems and inquiries.

"Those planes overhead are safer because of UNIMOLD . . . produced by Rome Cable which didn't say 'No' to a new problem that involved making a product outside our regular line of business". . . says Romey.

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK



Designed and built to stand up and deliver the goods under the most severe conditions!

★ The Whaley "Automat", first and foremost, is a high capacity, low maintenance coal loader. In addition, it has proved to be an outstanding machine in the heavier duty of complete seam mining where coal and slate or rock are shot together and loaded in one operation.

The basic reason for the Whaley "Automat's" ability to stand up and deliver the goods under severe conditions is its smooth, automatic shovel action which is an exclusive feature of the Whaley "Automat". It is this smooth, easy, shoveling action that permits the Whaley "Automat", operated by only one 25 H.P. motor, to maintain an average loading rate of 3 tons per minute in coal, rock or any other loose material.

Write for further information about the "Automat" for coal loading, complete seam mining, cleaning up falls, grading, brushing or other rock work. When writing, give us some information regarding your present operating conditions.

Anticipate your loading machine requirements for 1946 now. And remember . . . you get an all purpose machine when you get an "Automat". Myers-Whaley Company, Knoxville 6, Tenn.

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Mechanical Loaders

Exclusively

for Over 37 Years

HOW MANY TRIPS DO YOU MAKE TO DELIVER 60 tons?

One trip does it WITH A WALTER TRACTOR TRUCK

If you need more than one truck or one trip to deliver 60 tons to the plant, you're using more trucks—more driver time—more gas, oil and rubber—more maintenance time than a *single* Walter Tractor Truck needs to do the same job. And the longer your trip, the more this is true

Despite this enormous payload, the Walter Tractor Truck is neither ponderous nor unwieldy but highly maneuverable. Full loaded, it hauls at normal truck speeds and keeps going in soft dirt, deep mud, on steep grades and slippery surfaces. For it has the unfailing traction of the Walter Four Point Positive Drive. Three automatic locking differentials arrest wheel spinning, thus prevent tire grinding and road gouging.

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FOUR STAR PERFORMANCE

is a peacetime MUST with Union Wire Rope

In the battle to keep Old Glory flying, the Union Wire Rope organization is proud of winning the Minute Man flag and the Navy E Burgee with four stars signifying the limit of renewals for maintained excellence in war production. With war-sharpened skill our organization is determined to render four star performance in the service of private industry postwar. In the meantime, our current advertising funds are devoted to furtherance of sound plans offering full opportunity for competitive private enterprise to survive and expand on a sound foundation.

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. . . ABOUT FACE !

About faced, the forces that generated the world's miracle of production can rebuild the economy, make jobs, combat inflation and postwar slump. To do this, however, private industry must have freedom of enterprise stimulated by fair and honest competition. To have this, private industry must see to it that sound plans are first made, then carried out without becoming hamstrung.

For example, legislation for a highway program has been passed by Congress. It calls for a great highway system to be built by efficient contract competition. Most states are far from ready to meet its requirements which call for completed, approved plans before contracts can be let. Definite action is being taken by many responsible officials, but it is a big job and every cooperation should be given them so that time will not be lost because of unprepared plans. Important information on this subject is available in the book "The Road Ahead" published by the American Road Builders' Association, Washington, D. C. It should be read by every person interested in keeping America the land of opportunity. Check the coupon for a copy of this book and send today.

Another project vital to the national economy is developing. The Civil Aeronautics Administration report to Congress included a plan for national airport development. "Put Your Town on the Air Map" is the title of a book published by Personal Aircraft Council of the Aeronautical Chamber of Commerce of America, Inc., Washington, D. C. Send coupon below for this book.

UNION WIRE ROPE CORPORATION, 2130 Manchester Ave., Kansas City 3, Mo.

☐ Send a Free copy of book entitled "The Road Ahead"

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For full data on CP Post-Mounted Coal Drills, write for Catalog 901—on CP Hand-Held models, write now for Catalog 902.

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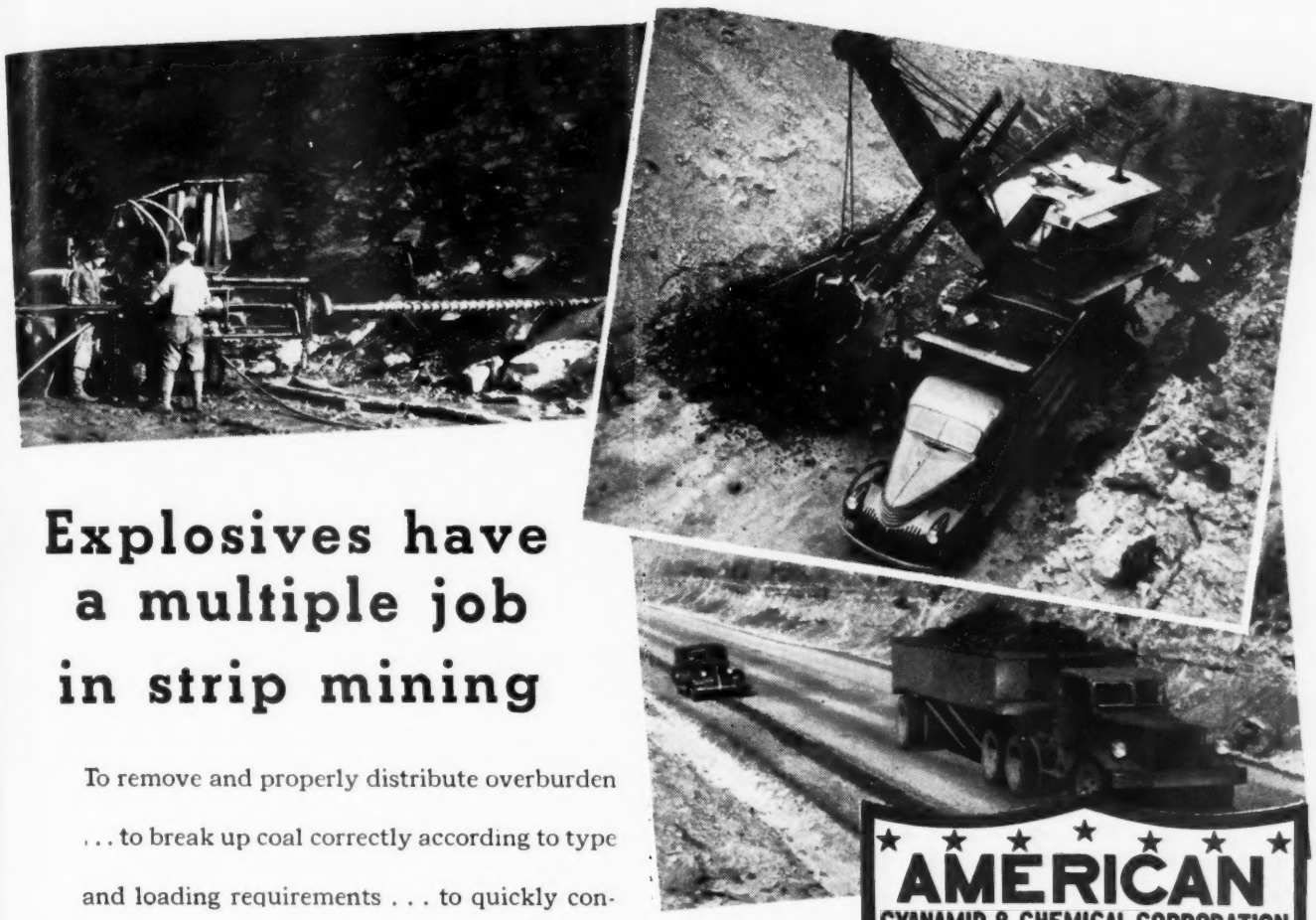

Explosives have a multiple job in strip mining

To remove and properly distribute overburden . . . to break up coal correctly according to type and loading requirements . . . to quickly construct roadways . . . these problems will be solved if you

Select the correct Explosives

Products of intensive research, chemical control, thorough inspection and unremitting care in manufacture, the list of available AMERICAN explosives and blasting supplies will provide the blasting agent best fitted to every application in strip mining.

• *Capable field engineers are available at your call.*

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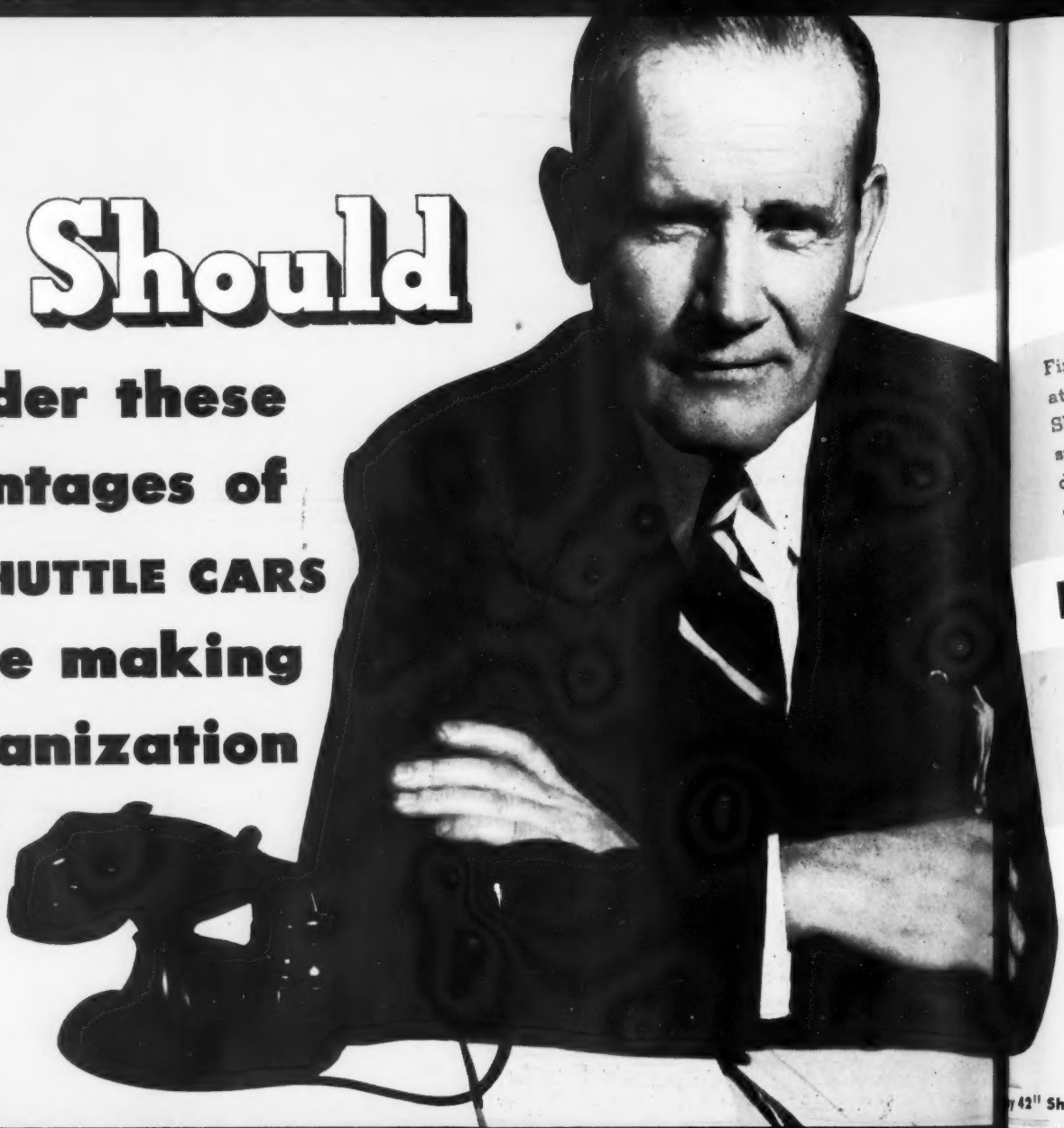
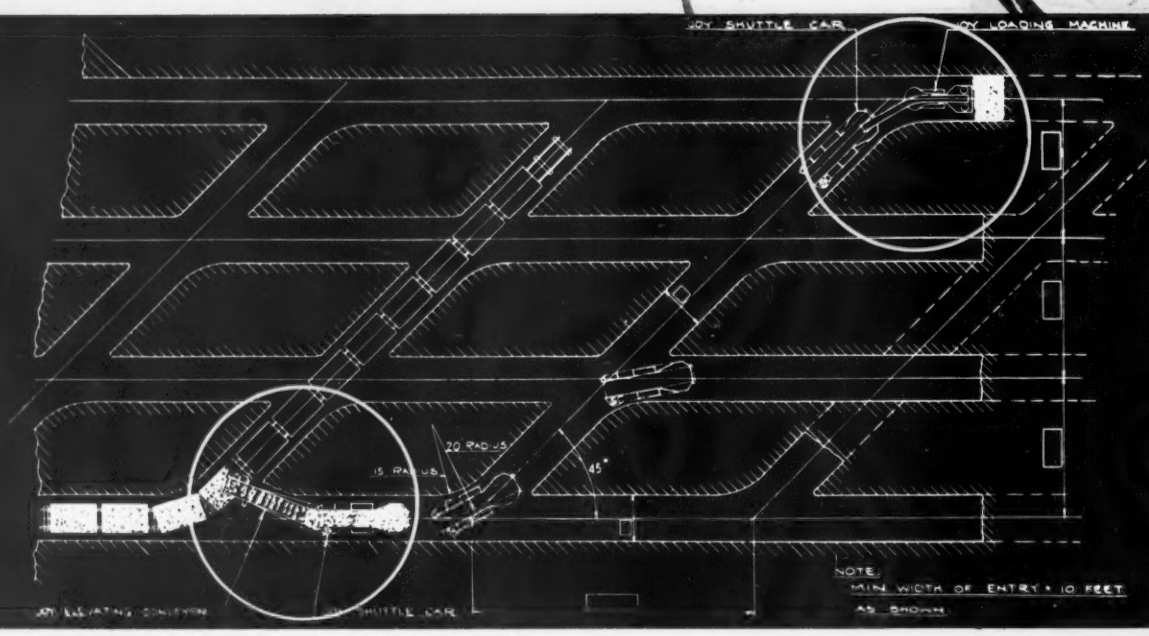
You Should

consider these advantages of JOY SHUTTLE CARS before making mechanization plans





JOY MANUFACTURING

Saves many man-hours

Finger-tip controls enable a single operator to drive, load, and unload the Joy Shuttle Car. A conveyor type of bottom speeds up loading . . . permits it to be done directly from a Joy Loading Machine, at the same time evenly distributing the load throughout the car. No extra handling along the line . . . no "jockeying" of cars for position or extra men needed to shift equipment to accomodate the loader. It is extremely flexible . . . adaptable to many needs.

Eliminates moving of stationary equipment

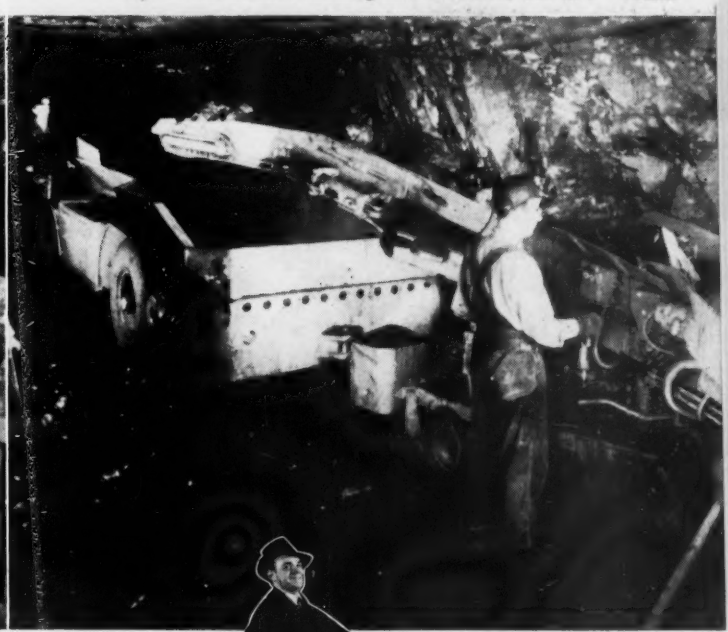
There are no rails to lay, pick-up, and relay when a mine is shuttle-car equipped. That's another fact worth considering, particularly if speed is important to reducing production costs. Joy Shuttle Car Mining has the further advantage of requiring no "time out" to lengthen belts or add another section onto conveyors. Cars may be kept in motion a greater percentage of working time.

Has low maintenance cost

Because they're sturdily built, Joy Shuttle Cars can take plenty of punishment without breaking down. For regular over-hauls and periodic check-ups, all machinery is easily accessible, permitting the work to be done in a minimum of time. Low maintenance costs mean lower overhead . . . more margin of profits on production for you. Investigate Joy Shuttle Car Mining today!

42" Shuttle Car discharging its load into a Joy Elevating Conveyor.

Joy 11 Bu. Loader loading into a Shuttle Car in 7' seam.



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109 Years of Experience Behind Every Foot

In more than a century of manufacturing Safety Fuse, Ensign-Bickford has kept foremost the basic ideal of its founder — an ideal of greater safety in blasting.

But no fuse, however dependable, can eliminate mistakes or carelessness in its use. Only the miner, pitman,or blaster can control these.

Never try to shortcut the tested and proved methods of Safety Fuse use — cutting clean, seating firmly, crimping tightly, centering accurately, and tying securely.

Never value a few inches of fuse more than your life. Don't short-fuse!

When used correctly, Ensign-Bickford Safety Fuse can bring you the full benefits of 109 years of experience.

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Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Ivan A. Given, *Editor*

JUNE, 1945

Time to Stand Firm

CONSIDERING what happened in 1943, when the government took over by fiat, the new 1945 wage agreements might be regarded as fairly good settlements even though they again raise costs and further complicate the problem of improving relations between management and men. The settlements reflect real credit on the operator representatives who negotiated them, and in its trial run the new bituminous set-up proved its right to serve as the basis for further progress.

Some of the developments following the completion of the contracts, however, can scarcely be regarded with satisfaction, unless by business baiters in Washington and elsewhere. OPA, in view of its persistent drive to eliminate profits in industry, can fairly be placed in this class. OPA's record in the coal cases, as in others, leads inescapably to the conclusion that it is doing its share in hamstringing industry and thus making it easier to bring it under complete federal control—a paramount objective with the New Dealers, who still are in the majority along the Potomac.

Other federal officials and agencies have earned a fair share of the credit for another threatening development. This is the growing disposition of miners—undoubtedly taking their cue from their leaders and New Deal helpers—to follow their own notions about contract observance. Wildcat strikes, trumped-up grievances and organized efforts to nullify management are evidences of growing lack of discipline that should be a matter of grave concern to union officials really interested in living up to their professions of responsibility. More than that, a strengthening of the trend toward irresponsibility should put management on its guard against appeasement, contract "interpretation" and other devices designed to weaken its position. Experience has proved that strict observance of contract terms is far the best. If union leaders will not respect their obligations, management must be prepared to protect the interests of the industry and its customers.

Right Approach

WITH INDUSTRY everywhere more and more the target of restriction and regulation by federal and State legislative bodies, it is not surprising that strip mining, in part due to its rapid increase and spread to new areas in the war years, should come in for a shower of attention in recent months. It is safe to say, in fact, that the industry now has on its hands the hardest fight in history and that if its attackers win they will establish an atmosphere making it that much easier to extend the principle of restriction and regulation of operations to other types of mining—deep as well as strip.

Most of the legislative proposals turn on a point the majority of the leading strippers agree is a matter for industry action and a responsibility they are ready to discharge. In all fairness, they should have an opportunity to demonstrate that their program for getting the most out of stripped territory is better than unproved suggestions involving heavy costs with no guarantee of results. But mere opposition is not enough. Indiana has perhaps shown the way by sponsoring its own legislation incorporating methods that time has shown will produce results, supplementing it with industry-financed research into further utilization of stripped areas for maximum yield of products and pleasing appearance.

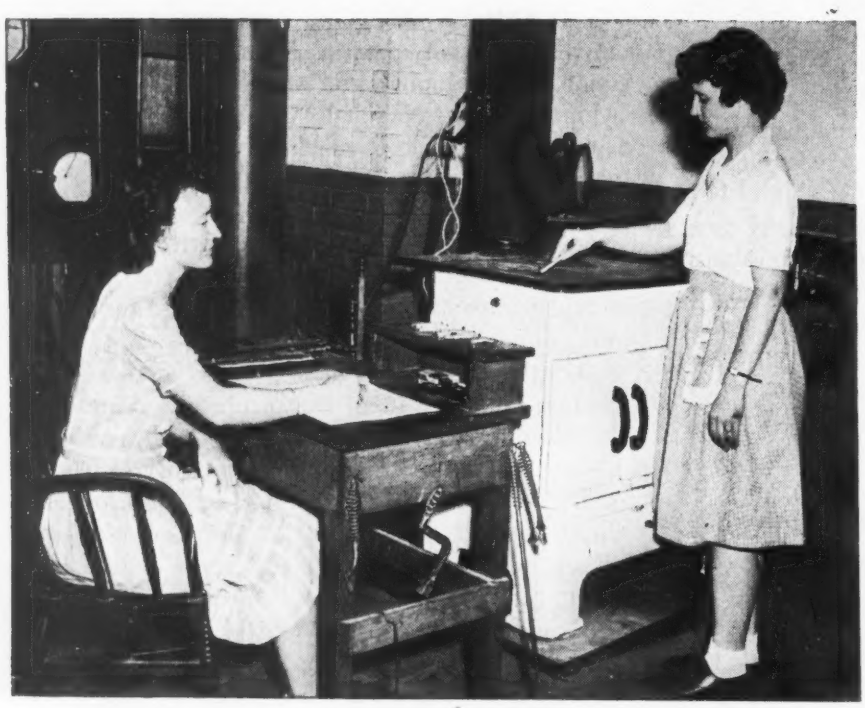
Still Valid

"THE IMPORTANCE to employers of the type of man that represents them as foremen and shift bosses cannot be overemphasized." So says Dr. George W. Taylor, chairman, National War Labor Board, in the May issue of *Engineering & Mining Journal*, a McGraw-Hill publication. Emphasizing this point, Dr. Taylor also declares that "foremen and shift bosses must be depended upon as important representatives of management." This and other evidence buttress the principle that bosses are a part of management and can serve and prosper only when they function as such.

A healthy, prosperous coal industry demands the maximum efficiency in management, and attempts to split it and organize part make it that much more difficult to obtain the cooperation and efficiency so vital to industry progress. "In the last analysis," as *Coal Age* pointed out last September, "organization of bosses turns on two questions. The first is: Will it benefit the industry? The answer is no. Organization of bosses destroys the efficient management teamwork so necessary for progress. The second is: Will it benefit the boss himself? Again the answer is no. A union—any union—can offer the boss nothing but regimentation to a dead level and curtailment of opportunities."

Anthracite Prepares for Tomorrow

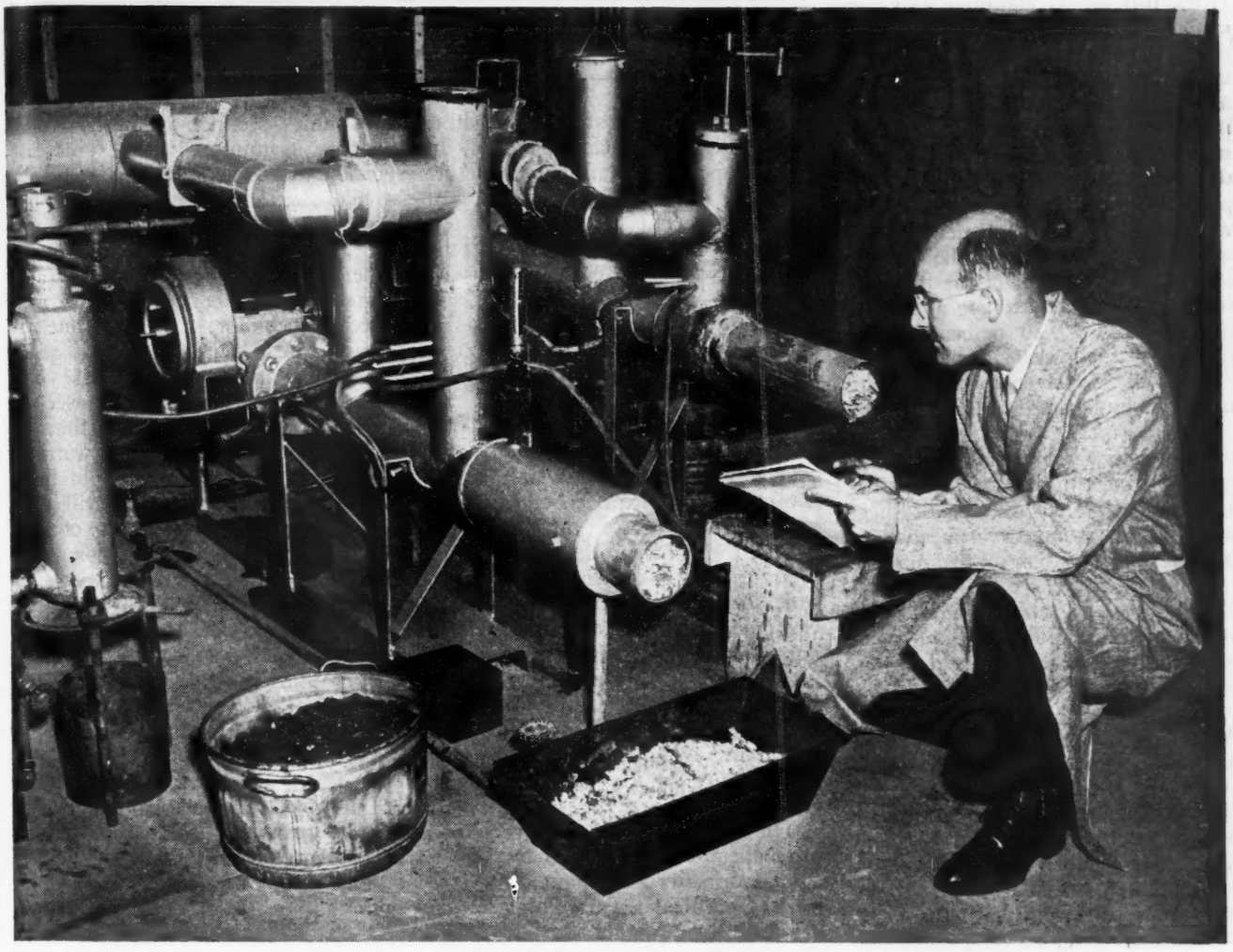
A new battle with competitive fuels faces anthracite at the end of the war if not before. It will require the utmost in cost reduction, product quality and service to the consumer. Anthracite is getting ready. In the following material, Coal Age analyzes the problems and prospects. Tough spots are not lacking, but with harder work and continued industry cooperation anthracite's future outlook is promising.



A big market for anthracite is the humble kitchen range, and tests like this are designed to increase both its efficiency and its convenience.

MORE THAN 6,000,000 customers in 17 states burn anthracite coal in anything from stoker-fired boilers to hand-fired pot stoves. Last year they burned 61,868,000 tons of it, highest commercial consumption of hard coal in 13 years. Will they continue to burn it in equal or greater quantities after the war, when competitive fuels will be more available, when new and better equipment begins to flood the market, when every customer's cellar becomes a potential battleground among anthracite, other solid fuels, oil and gas?

Leaders in the anthracite industry, individually and collectively, have been pondering the answer to that question for months as they study the industry's needs—postwar and immediate. The best brains of the industry, technical and executive, have been directed toward finding the answer because anthracite men know that if they come up with it, they also will have the answer to this larger question: What is the future of anthracite?



Anthracite's champions in the competitive battles of the future include the Anthratube now being prepared for the postwar market. Here, two test units are shown under fire at the industry's Primos laboratory.

Fortunately, it can be stated at the outset that at least certain factors are propitious. The industry is in more unanimous agreement on the necessity of doing a thorough job of postwar planning than it has been on any recent problem. The money to do it is available and so far has been forthcoming. There exists today little of the apathy that permitted anthracite to be caught asleep after the last war. An encouraging start has been made. If the job is carried through in the same manner, there seems ample justification in forecasting a healthy, prosperous future.

Much of the work, of course, still remains to be done. The anthracite industry still is seeking the answers to two questions: Can it retain its present six million customers? Can it increase them?

The basis for the answers must largely be supplied by the customers themselves, in the opinion of the industry. What do they want from their fuel? How much will they pay to get it? To find out, the industry is going to the Mrs. Jones'—Mrs. Vanderbilt Jones, Mrs. William Jones, and Mrs. Bill Jones. It is axiomatic, of course, that everyone wants maximum convenience in heating, but can everyone pay for it? Mrs. Vanderbilt Jones can. Mrs. William Jones is debating the question, but Mrs. Bill Jones is sure she cannot. Its market analysis (the first complete one ever undertaken by the industry) leads anthracite to list these six factors as determining what fuel the customer selects:

His needs and desires in terms of heat.

The type of equipment he has or will have.

The degree to which he is financially willing and able to supply his heating needs in relation to his desires.

The availability of competing fuels.

The cost and quality of anthracite in relation to competing fuels.

The effect on the customer of promotional and selling efforts by competing fuels.

Those six points are the guide posts. They can be grouped under the two broader objectives of anthracite's immediate and postwar plans: greater convenience and lowest possible cost. In studying those two goals, anthracite's market analysis revealed some rather startling facts. Among them were:

Emphasis on convenience falls sharply as purchasing power decreases.

Emphasis on cost rises sharply as purchasing power decreases.

The consumers who can afford the ultimate in convenience without regard to cost (Mrs. Vanderbilt Jones) comprise only 6.8 percent of the total possible market.

The consumers who can afford a varying degree of convenience with growing regard to cost (Mrs. William Jones) comprise 70.1 percent of the total possible market.

The consumers who value cost over any consideration of convenience

(Mrs. Bill Jones) comprise 23.1 percent of the total market.

Of consumers in the highest income bracket, less than 20 percent are anthracite users and more than 70 percent are oil users. Of the upper middle income bracket (24.5 percent of the total), anywhere from 20 to 35 percent are anthracite users and anywhere from 70 to 45 percent are oil users. Of the lower middle income bracket (45.6 percent of the market), from 35 to 50 percent are anthracite users and 45 to 20 percent are oil users. Of the lower income bracket, upward of 55 percent are anthracite users and less than 20 percent use oil.

This all means, a substantial body of anthracite opinion holds, that too great a concentration on competing against completely automatic heat would find the industry appealing to only a small fraction of its possible customers, whereas by directing its campaign toward selling a quality fuel at low cost and still furnishing every possible convenience it would be appealing in varying degree to a large percentage of the possible market. Anthracite believes its first duty is to hold its present market and keep its customers happy so that they not only will continue to buy anthracite now but, if the happy day comes when they advance into a higher income bracket, will take a friendly feeling toward anthracite with them.

That conviction has resulted in two other conclusions about present and postwar markets:

1. Anthracite already has a differential in its favor on cost.

2. By stressing certain elements, it can come very close to closing the gap between it and other fuels on convenience. As a result, anthracite has listed certain primary functions for its advertising, publicity, public relations and research jobs from now on. Frankly, the industry does not yet know the relative weight to place on each, but in the order in which the industry plans to develop them, they are:

1. Low cost.
2. Product quality.
3. Consumer education.
4. Dealer service.
5. Equipment, including thermostats, modern hand-fired equipment and stokers.

Coal Age discussed all these phases of present and postwar markets with leading producers, progressive distributors, and the industry's public relations and research organizations. Here are their estimates of the prospects and what is being done to improve them.

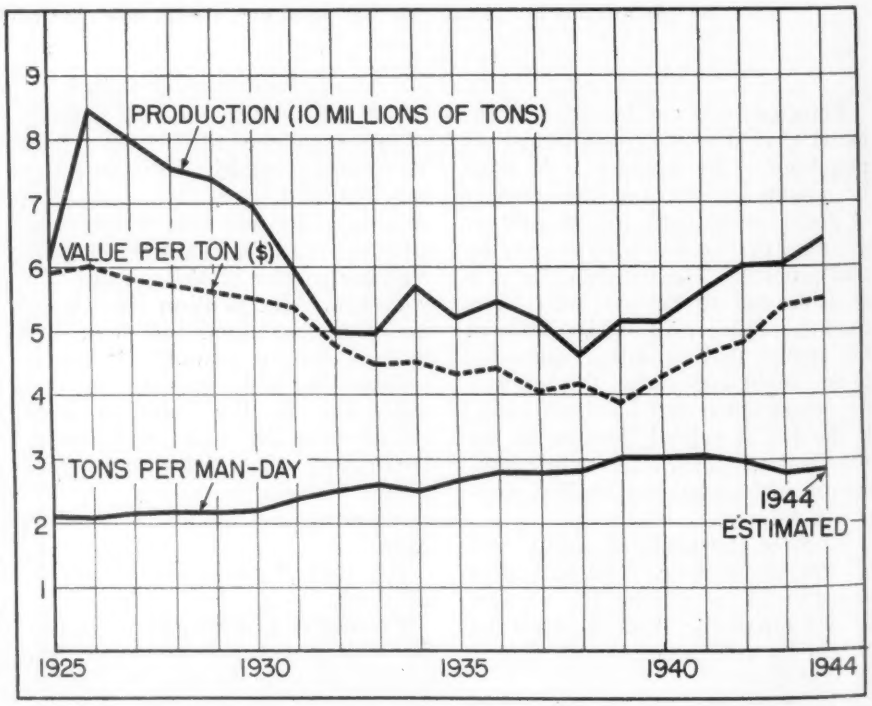
LOW COST—PRODUCT QUALITY

These two factors are taken together because they are so closely related. In some respects, the anthracite picture began to look better after 1932. At least the decline in production was halted and by 1940 was showing some signs of turning up even without the stimulus of the defense program. When examined in detail, however, the bulge in bank, dredge and strip coal at the expense of deep-mined tonnage forecast difficulties in the future unless the industry can get the cost of deep mining down. While average value at the mine and cost to the consumer have been crawling up since the war started, they were still less in 1944 than in 1929, 1930 and even earlier—something few other fuels can claim. If anthracite can continue to increase output per man, particularly in deep mining, it has a good chance of preserving its relatively advantageous position in an important respect—impact on the buyer's pocketbook nerve—while retaining a reasonable chance at a profit and still compete with other fuels.

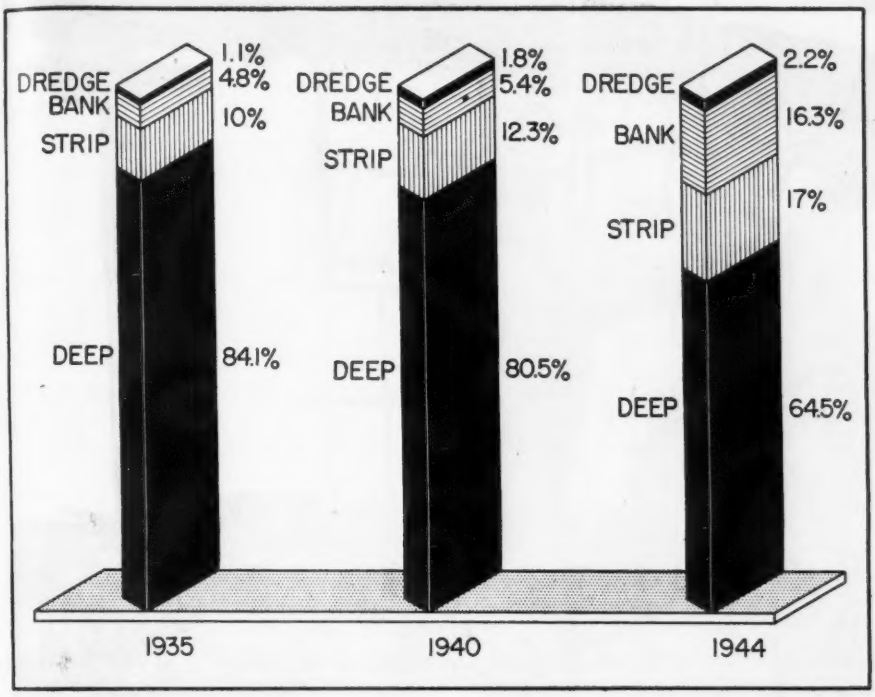
The primary production problem, most operators believe, is one of labor costs, normally comprising 65 to 70 percent of the cost of mining a ton of anthracite. Can the further use of mechanical equipment bring down the unit production cost? Will changes in mining methods increase efficiency? How will the trend to smaller sizes affect the industry? What are the possibilities of non-fuel and other uses for anthracite? These and other questions are being asked (and sometimes answered) by the producers, including the vital one of How far are the miners ready to go in supporting attempts to increase efficiency and reduce delivered price?

Many operators believe that if labor attempts to hold all its wartime gains in what probably will not be a wartime market, anthracite will face a squeeze between rising costs of production and lower realization that would seriously interfere with its ability to compete with other fuels. The operators view with grave misgivings the pattern that John L. Lewis is attempting to set in the bituminous fields, and fear the situation will get worse before it gets better.

One answer to higher labor costs obviously is increased mechanization, but anthracite producers point to two stumbling blocks: the nature of anthracite mining precludes the degree of mechanization possible in bituminous mining, and unit production costs will not decline any appreciable degree if miners insist on the same



CLIMBING UP—If it can lick its other problems, including a recent and perhaps temporary recession in output per man-shift, anthracite has in its favor a production curve that was climbing even before the war plus a delivered price only now beginning to approach that of 20 years ago.



PICTURE OF A PROBLEM—Lower production cost has stimulated large gains in bank, dredge and strip coal in recent years at the expense of deep-mined tonnage. When these are exhausted or become more difficult to produce, deep mines must pick up the load, and the industry looks to modern equipment and methods to provide the low cost essential to the preservation of anthracite's competitive position.

payment per ton with mechanical loading as with hand loading.

One operator stressed the incongruity of paying a miner a fixed rate for hand-loaded coal when he loads 5 tons a day and paying him the same rate for machine-loaded coal when he can load 10 tons a day. Obviously it would be much fairer to adjust the rate. The miner would benefit because he would be getting more money for easier work. But so far the union has refused to make any general concession for mechanical rates in the anthracite field, and thus one of the prime incentives for mechanization has been removed.

Stripping, which has taken a firm hold in most sections of the anthracite region, is a low-cost process, but can be used only when conditions are right. The opportunities probably are decreasing. Cheap bank coal, for which a wartime market exists, rapidly is being exhausted, and much of it would be uneconomical to reclaim during normal times.

Deep-mined coal in 1944 dropped to an estimated 64.2 percent of the total. Bank coal was 16.3 percent of the output; dredge coal, 2.6, and stripping, 16.9, all showing major increases over the past five years.

Bank, dredge and strip coal are comparatively inexpensive to produce. Deep-mined coal is comparatively costly. What will happen, the operators are asking themselves, when the banks are exhausted and when stripping sites are harder to find and more expensive to work? If deep-coal production costs continue to rise, the industry is inclined to fear that it may find itself unable to maintain a competitive price level. There is little question, however, that with good management and union cooperation, good opportunities for cost reduction still remain. Machinery, more efficient methods and realistic mining rates are among the answers, and the problem is one for employees and the public in the anthracite region as well as for the operators.

The trend to smaller sizes is another consideration which worries the producer. He sometimes sees a two-edged sword in automatic equipment. His best profits are in pea coal and larger. Yet automatic equipment generally is designed for the smaller sizes —an excellent idea to provide a market for No. 1 buckwheat and smaller unless the tail begins to wag the dog. The significance of the trend has been recognized in the Anthratube, which is designed to burn pea and chestnut.

Coking of small coal, briquets, admixtures of anthracite fines with bituminous, the use of fines as water filters and a promising if yet undeveloped opportunity for making gas from fine sizes all are being explored in an effort to market more small coal.

There is a keen realization of the importance of competent supervision in holding down production costs, and most companies have made provisions for intensive work on foreman training. Some of these programs have been delayed because of the war, executive management feeling that the supervisor was busy enough without asking him to take on additional tasks, but foremen training is high on the priority list of postwar plans.

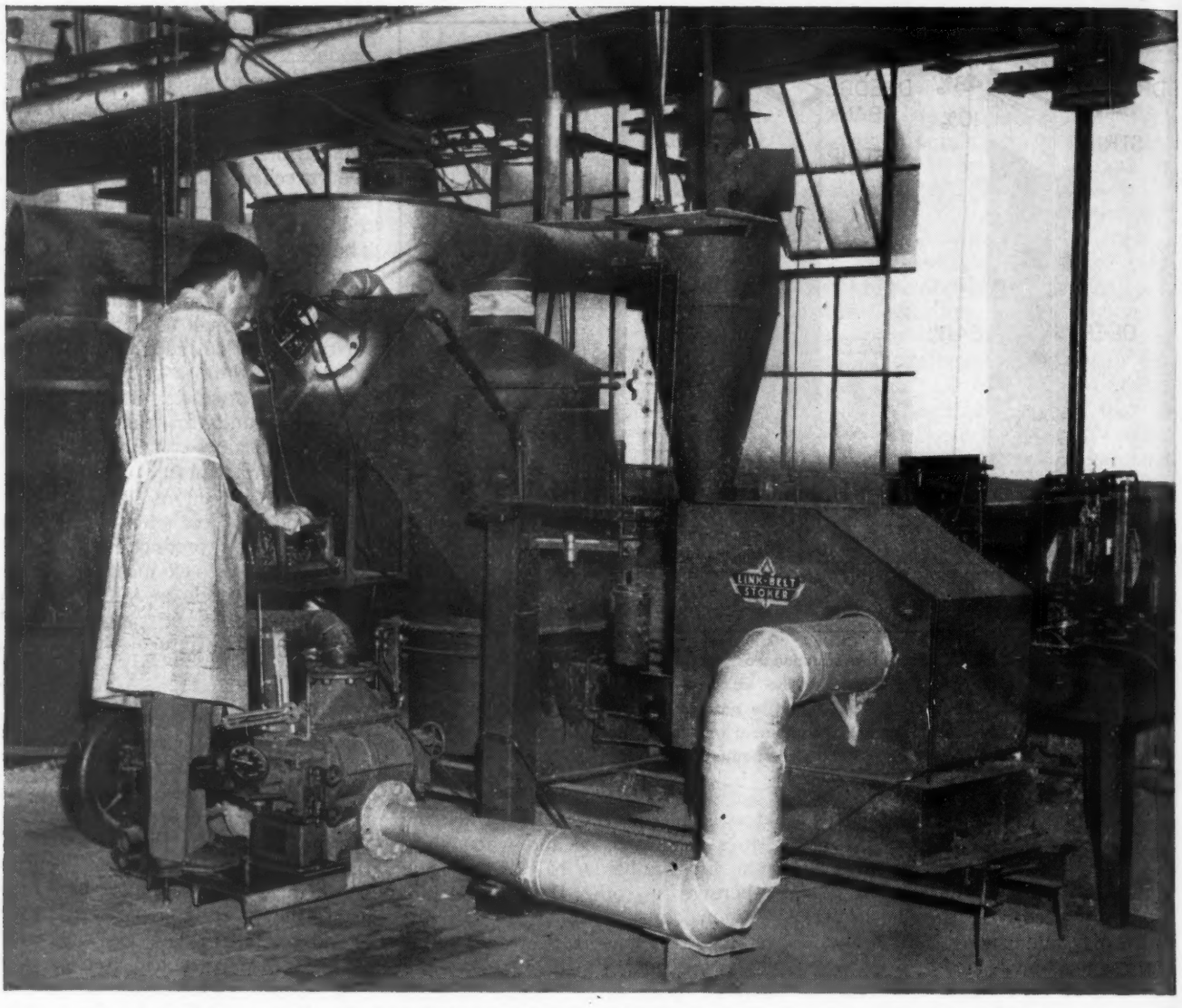
The industry feels that one of its best talking points in the postwar scramble for fuel markets will be that the quality of anthracite has been maintained during the war. There have been exceptions, of course, but, considering all the adverse conditions which the industry had to face, the coal has been clean, well prepared and properly sized. There has been little of what the trade calls "cocktailing" —the mixture of a load of low-grade, high-ash, stone and slate-filled coal with several loads of high-grade coal. Constant inspection and close surveillance by the operators themselves and regulations of the Solid Fuels Administration for War have been responsible for that record.

CONSUMER EDUCATION

It is in this phase of anthracite's program that immediate and postwar plans blend. The long-range view is to educate the customer in the conviction that anthracite provides even clean, silent and safe heat. Right now the emphasis is on telling him how to burn less of it and still obtain satisfactory results, a campaign which will be continued even after supply again becomes plentiful.

Once again the industry decided to go at the matter scientifically instead of guessing. The Committee on Consumer Relations in Advertising, an independent national organization, has discovered that the best form of advertising at the moment is that which shows the consumer how to conserve and yet get the most out of his equipment. Ninety-five percent of the higher-income-bracket consumers approve it, 96 in the medium bracket and 95 in the lower bracket.

As a result, anthracite's consumer education program, in which it hopes to integrate all advertising, company and industry, will stress such ideas as



Stokers will play a major role in bringing greater convenience and economy to anthracite users. The industry's technicians are constantly engaged in tests to learn more about them and help improve their performance.

"Here is How We Are Saving Coal and Still Keeping Our House Warm." It will be testimonial advertising from actual users of anthracite. Every ad will bear the legend "Good Judgment Selects Anthracite for Good, Economical Heat."

One of the major advantages of this form of consumer education, the industry feels, is its flexibility. It is a simple matter, for instance, once the pinch in coal is eased, to change from the theme of saving fuel to a message that might announce: "Here is the way to have a good, warm house and keep heating costs down."

As important as what to say is to whom to say it. Hitherto, the industry has used more or less the shotgun technique. It directed its message more on a population basis than on a potential user basis, largely because the latter figures were not available, or if available were not being used.

For instance, a market analysis would show a great many wood users in anthracite-consuming areas. Potentially, they should be anthracite customers, but no market data are available to show the local conditions which enter into the picture. The same is true as to coke, gas, or other competing fuels and consequently it is difficult in some cases to tell whether the industry would have a good chance of changing the picture in some localities or whether its efforts probably would be more fruitful elsewhere.

Advertising authorities declare that, to obtain the best results, every possible factor in every market area should be obtained and valued. Anthracite is now in the process of undertaking such a market analysis to distribute its advertising message with the least possible waste.

DEALER SERVICE

Because anthracite coal is 90 percent domestically consumed, its problems of distribution and merchandising are heavily underscored. The retail dealer is almost always the only contact between producer and consumer. Only infrequently does the consumer know the brand name of the coal he buys. He orders 8 tons of "coal," and if he is in the anthracite consuming area he assumes naturally that he is going to receive hard coal. But rarely does he know who produces it, what field it comes from or anything else about it. If anything goes wrong, he blames his dealer and "coal."

That circumstance makes relations

between dealer and producer all the mere important. Some of the questions it raises are: "How much service is the dealer expected to supply the customer?" "Who is going to pay for supplying such service?" "How much responsibility must the producer shoulder for the dealer's behavior?" "Who should take the lead in fostering better merchandising methods?" "Is it up to the producer to show the dealer how to make a profit?" "How about dealers handling competing fuels?" "How far is the dealer expected to go into the equipment market?"

The anthracite industry knows the day is past when its salesmen can dump a few carloads of coal in a dealer's yard and expect him to get rid of it. It hopes the dealer realizes that the day is past when he can sit in his office and do nothing but accept orders.

Most retail dealers handle several types of fuel: oil, anthracite, coke, bituminous. Right now, of course, they sell what they have and what the customer can use. Normally they sell what the customer wants and what brings them a profit. Unless there is an incentive to push anthracite, the average dealer is not going to break his neck to favor it over anything else he can sell. As a result, anthracite producers realize that if they expect the dealer to take on the added responsibilities (and expense) of service and equipment, there must be a profit incentive.

If a dealer or group of dealers are expected to cooperate on such a project as Furnaceman, Inc. (*Coal Age*, July, 1944, p. 62), then it is only fair that an equitable arrangement be worked out between producer and distributor. Whether such services are to be financed by the dealer alone, by producers alone, on an industry-wide basis or by dealers and producers in an area, are matters which can best be determined locally. The results of early experiment with such plans show they have sufficient merit to warrant a thorough exploration of their possibilities by both dealer and producer.

The anthracite industry has done some excellent work in holding dealer clinics. More remains to be done and is early on the program for the industry's immediate and postwar plans. Retail coal dealer outlets are generally old and established firms. They are not, unfortunately, always progressive. So if the producer expects the dealer to spruce up his trucks, uniform and educate his drivers, streamline his yard and learn the importance of courteous telephone and sales techniques, then he must also show him how such methods will bring more and better business. It certainly is not asking too much, however, for the producer to expect that the dealer in turn will not simply wait for business to come to him but instead will realize that he, too, has a public responsibility and certain standards of service and ethics to maintain.

Anthracite's work with dealers to date has been directed, of necessity, along an entirely different line, but one which arrives by indirection at the same goal. The necessity for conservation has compelled the dealer to learn how to tell his customers how to use less coal instead of more, but all that adds up to good will which should keep anthracite retailers out of their customers' "little black books" postwar.

Some dealers fight shy of the equipment market because they feel the profit they make does not justify the service they are compelled to render. But the handling of equipment by the dealer possesses certainly one virtue—it prevents the blame for dissatisfaction from being batted around among fuel dealer, equipment salesman and equipment installer until the customer is thoroughly fed up with all three. Equipment lines should, in the long run, sell more coal for the dealer.

But equipment is a problem. If the customer decides he would rather have an oil burner, too few dealers are willing or able to put up an argument, particularly if they also sell oil.

Anthracite producers are aware of

Not overlooked in postwar anthracite plans are the space heater (right) and the fireplace—a popular auxiliary heating means in the present war period.

these barriers in their relations with dealers, and are striving continually to bring about closer and better understanding of mutual problems. Much of that has come and will continue to come from frequent meetings with dealer organizations, talks by representatives of the industry and of the companies to dealers and the free exchange of ideas and closer communication between producer and dealer by the use of more and better salesmen.

EQUIPMENT

Because the emphasis so far has been on fuel, it should not be concluded that the anthracite industry has neglected convenience. On the contrary, both the industry research laboratory at Primos, Pa., and individual company laboratories have been testing and developing equipment designed to help anthracite compete better with other fuels for postwar markets.

It may seem a radical departure for a research organization, but the Anthracite Industries Laboratory is much more interested in finding out what a piece of equipment will do than it is in arriving at arbitrary standards. That approach comes from the conviction that Mrs. Jones is not one hoot interested in B.t.u.'s, thermal efficiency or combustion characteristics. She wants to know, when she sets out to bake a cake, how long the oven will take to get hot and whether the cake will be done in the middle instead of burned on the edges.

Experiments with anthracite-fired cooking ranges (of which 738,371 were sold in 1939, the last year for which the industry has figures) show that, ideally, it should come up to a temperature of 700 deg. F. maximum in the morning. It is held there normally for about a half hour, then banked, brought up again at noon, banked, and brought up in the evening. Mrs. Jones wants to know how to do all that, not why.

The laboratory found that by hit-or-miss methods it often took as long as four hours to bring a stove to the proper temperature. They experimented and found a reasonably simple answer, which was passed on to the manufacturer. If pea coal was used with a red zone of 3 to 4 in. in the fire box, a temperature of 700 deg. F. could be obtained in 10 minutes. The laboratory told the manufacturer how to do it, and advised him to pass that knowledge on to Mrs. Jones.

That is the type of work which the industry's laboratory is doing. It does not believe in telling a manufacturer a piece of equipment which he has submitted for tests is not good. It believes in telling him how he can improve it.

Here are some of the matters which have been occupying the attention of the industry's technical experts during the past year:

GRATES: Use of rounded ends on grates instead of square or angled, so that the aperture when shaking remains the same and thereby prevents clogging by a piece of coal or other matter.

CHIMNEYS: Preparation of specifications so that chimneys will be adequate and overcome the tendency to make them so skimpy that they reduce the necessary draft.

WATER HEATERS: Testing of heaters not to see what their rating is but to see how quickly and economically they will heat water when it is being drawn off as it is in the average home.

DAMPERS: Better location and a design to facilitate particularly mild-weather banking without loss of fuel or extinguishing of the fire.

THERMOSTATS: Testing and development of thermostats ranging in price from $12 to $35 that will regulate the furnace so that it needs attention only twice a day except in exceptionally cold weather; experimentation with outdoor thermostats to provide further control.

ASHES: Deeper ashpits to check dust; ash cans inserted into the floor of the basement; furnaces constructed with doors that are kept closed during shaking but with a peephole so that the curious can see what's going on inside.

ASH REMOVAL: Development of a small, cheap conveyor system which takes the ashes outside the home.

FUEL: Development of a chart or slide rule by which the furnace serviceman or coal-truck delivery man can tell the consumer exactly what results he can expect from each size and type of coal.

STOKERS: Constant experimentation with all types of stokers to learn what fuel burns best in them and what improvements can be made in firing, burning and ash removal.

But all of these developments, interesting as they are, have been overshadowed during the past year by the experiments on the Anthratube—the "heat jeep"—which the industry believes will be its answer to the challenge of other fuels, particularly in the new low- and medium-priced postwar home.

Since last September, when the Anthratube was announced (*Coal Age*, September, 1944, p. 126), it has progressed from a principle for burning coal to the point where it will shortly be installed in a home on an experimental basis. Thirty manufacturers are working on its commercial development and it will be royalty-free to manufacturers who also work on the research for perfecting it. In addition to the conventional horizontal model, Anthracite Industries Laboratory and the laboratories of the Philadelphia & Reading Coal & Iron Co., the Delaware, Lackawanna & Western Coal Co., the Lehigh Coal & Navigation Co. and the Pennsylvania Coal Co. are experimenting with vertical and angled models.

Today's anthracite market unquestionably is slightly swollen. Yet in view of all the factors, there seems no more justification for gloomily forecasting that anthracite is doomed to return to the depths of the 1930's. A shrinkage in demand, if it takes placce, doubtless will be accompanied by a compensating shrinkage in bank and perhaps river and strip coal, and there probably will be postwar casualties among marginal producers. And while production may drop back temporarily there also is justification for the belief that it need not always stay down or even that it will stay down for a long period. Meantime, there seems no reason why there should not be an ample market for the efficient and aggressive operator, barring a major catastrophe or a national economic collapse—no reason, that is, if present plans for the industry are put into action, which means these four conditions:

1. That production costs remain at levels that will allow the industry to compete with any other fuel.
2. That adequate support be given to the industry's research, public relations and advertising programs.
3. That distributor and producer cooperate in employing modern merchandising methods and rendering maximum service to the consumer.
4. That, above all, the industry itself continues to believe the job can be done.

SHUTTLE CARS

Increase Loader Output in Pitching Coal

Shuttle Cars in Cross-Pitch Places Discharge to a Down-Pitch Gathering Conveyor—Loader Output Raised to 350 Tons per Shift in Coal Dipping 10 Percent Against 200-Ton Mine-Car-and-Locomotive Average

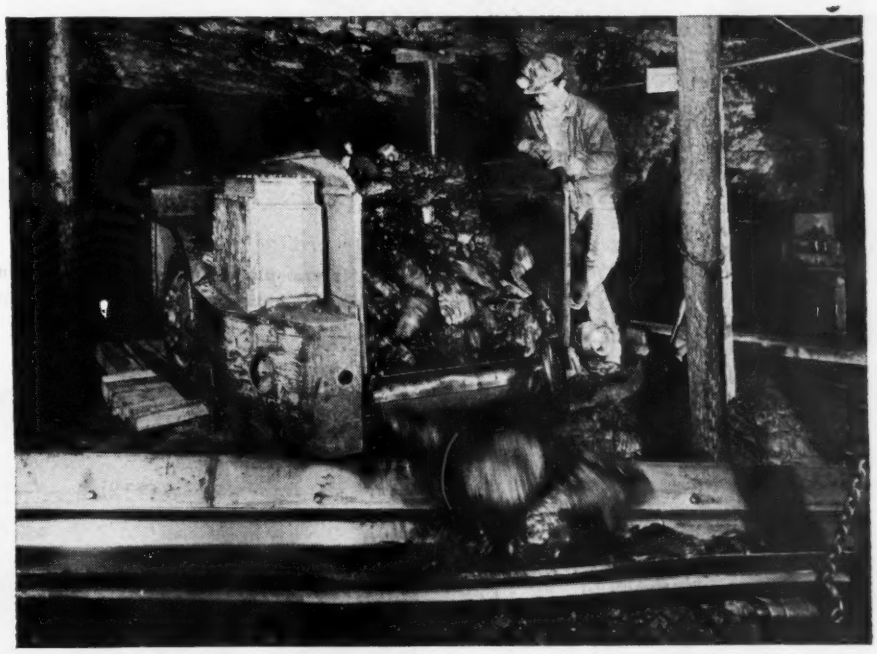
By FRITZ NYMAN
General Superintendent, Utah Fuel Co.
Castle Gate, Utah

And WESLEY HYATT
Assistant Chief Engineer
Salt Lake City, Utah

WITH THE WAR making manpower scarce and limiting supplies of materials, officials of the Utah Fuel Co., in common with those of other organizations, have given increased thought to methods of boosting productivity. Pitching coal at some of its operations, however, is a complicating factor in the Utah Fuel Co. picture. Nevertheless, the organization has been successful in employing shuttle cars where the formation dips an average of 10 percent and thus has found at least part of the answer.

The operation in question is Castle Gate mine at Castle Gate, Utah. The Mesa Verde formation coal being operated has an average thickness of 14 ft. to 24 ft. and an average dip, as noted, of 10 percent north. A Joy loader—the first of a number now in service—was installed in 1936 and present equipment also includes Goodman track loaders for entry development and Goodman shaker conveyors with duckbills for mining straight up the pitch.

The general plan of operation at Castle Gate is based on a drift opening to a main entry across the pitch on a slight grade favoring drainage and loaded haulage. Inside slopes fitted with hoists are driven up and down from this main entry. From these slopes room entries are driven across the pitch, again on slight grades favoring the loads, approximately parallel to the main entry. Room entries are spaced to give a room length of about 300 to 350 ft. when operating up the true pitch. When using mobile loaders the rooms are driven 45 deg. off true pitch. The usual practice is to drive room entries



Shuttle car discharging its 6-ton load into shaker line with built-up sides. The car is elevated to proper discharge height by laying a timber ramp.

Elevating conveyor receiving coal from the lower end of shaker conveyor and transferring it to mine cars holding approximately 4 tons. Signal lines (upper right) provide ready communication between loaderhead man, or trimmer, and shuttle-car operator.

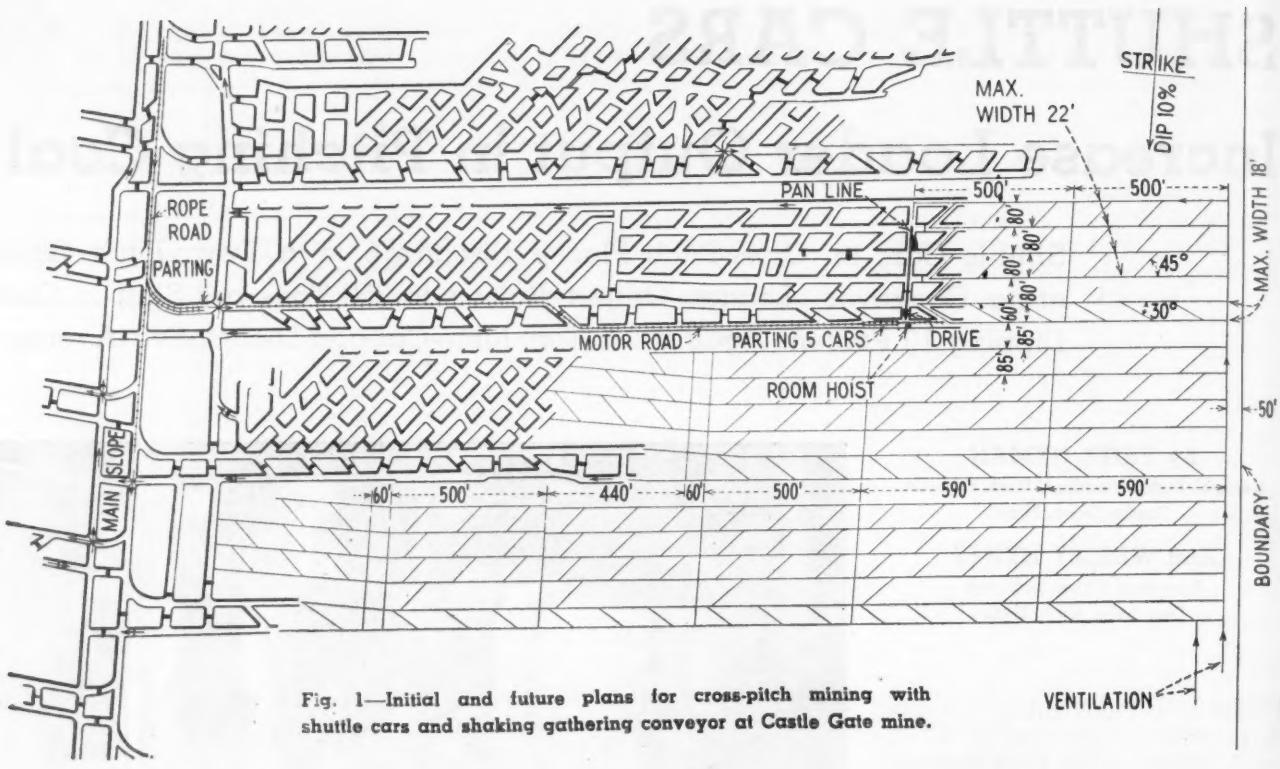


Fig. 1—Initial and future plans for cross-pitch mining with shuttle cars and shaking gathering conveyor at Castle Gate mine.

about 2,000 to 2,500 ft., developing the rooms on the way up and removing pillars or top coal on the retreat.

In view of the thickness of the coal, working places generally are driven not over 8 or 9 ft. high. When a room is completed the top coal is shot down, beginning on the inside end of the room and retreating back to the entry. Only enough coal is shot at one time to supply the loader about two shifts. By doing this the haulage is maintained under a normal 8 or 9 ft. of coal, where safety is greater.

Considering the pitch involved, serving loading machines with mine cars had definite limitations, although a creditable job was done using 4-ton cars and 8-ton battery locomotives. Average loading-machine output with this equipment and crews of 15 men, including haulage men, has recently averaged 200 tons per shift. It was felt, however, that if shuttle cars could be employed their higher capacity and other advantages would make possible a substantial increase in output per machine and per man on the crew. The problem then became one of applying the shuttle car, normally employed in level or lightly pitching coal, to the heavier pitches.

Reducing the pitch by angling the rooms was considered, but would have required an angle of 30 deg. or less, thus leaving long pointed pillars, which have been found to be a disadvantage in extracting top coal or pillars.

Another view of loading station and elevating conveyor, with signal system and hoist for controlling trip movement at left.

The decision to operate the shuttle cars on the strike required that some other means of handling the coal down the pitch be employed. While mine cars could have been used, it was considered that either a drag, belt or shaker conveyor would be better. Since it was felt that a shaker lent itself better to driving the conveying opening, as well as to transporting the coal from the shuttle cars, it was given preference.

The plan adopted, therefore, was to use the shaker with duckbill to drive a single opening straight up the pitch, tapping it into adjoining abandoned rooms for ventilation and turning cross-pitch rooms off it. A Joy 11BU loading machine served by two Joy 42-D 6-ton shuttle cars powered by 375-amp. Edison batteries then were sent into the section along with charging equipment, a Sullivan 7B short-wall with 7 ft. cutter-bar, Joy crawler-

mounted shortwall truck and Little Giant post-mounted drills. Battery-type locomotives and shuttle cars are used for safety reasons. The mine is extremely gassy and no matter how much water is sprayed on the coal while loading and cutting, considerable dust is made. Rock dust is used extensively and helps to eliminate the explosion hazard, but battery-type permissible equipment is another important safety precaution.

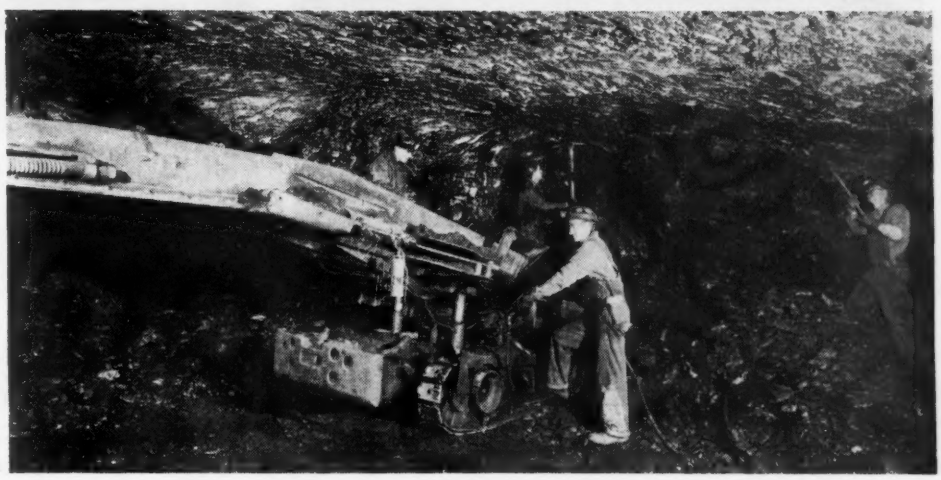
The shaker was left in place in the conveying entry to receive coal from the shuttle cars and in turn transport it directly to the mine cars at the foot of the conveyorway. Originally, this program presented at least two major difficulties: (1) The capacity of the conveyor with the No. 2 pans used was inadequate; (2) the conveyor had to be stopped while mine-car trips were being changed.

The first difficulty was overcome by building up the sides of the conveyor pans with ¼x8-in. steel strips bolted to the No. 2 troughing with three bolts, as shown in one of the accompanying illustrations. This, with operation on the 10-percent pitch, practically doubled the listed coal-carrying rate.

Difficulty No. 2 was eliminated by using an elevating conveyor to transfer the coal from the shaker into the mine car. This elevating conveyor acts as a surge bin, while ample height for any installation makes its employment advantageous. The capacity of the elevating conveyor is sufficient to permit changing cars but not enough for changing trips. However, the loaderhead man is able to control the trough-line operation in such a way as to make full use of its capacity and allow nearly sufficient time for change of trips.

Trips are handled at the loading station by a small Sullivan room hoist. The cars, holding approximately 4 tons, are loaded in trips of five, placed and removed by a storage battery locomotive. Carrying capacity of the trough line under best conditions is about 6 tons per minute. The average time for unloading a 6-ton shuttle car, however, is around 1¼ minutes.

On the basis of initial experience, the mining plan shown in Fig. 1 has been adopted for shuttle-car work. In this plan, once a section has been started, single conveyorways are driven up the pitch at intervals of 500 ft. as a general rule. The conveyorway is driven with the Joy loader and shuttle cars as the rooms advance. The duckbill is not used again after the first place has been driven up the pitch. With the two 18-ft. headings of the entry and four rooms a maximum of 22 ft. wide on 80-ft. centers, a territory consists of six working places. Slants not over 14 ft. wide on 30- and 45-deg. angles provide reduced grades for passage of equipment between places. Under this system production off the loading unit already in service is averaging 350 tons per shift with a 14-man crew. This performance, it is expected, will be bettered when more experience has been gained.



Above: drilling with post-mounted equipment. In the rest of the mine, however, drilling normally is done with machines mounted on the cutters. Above right: loading machine at the face ready to fill a shuttle car in a cross-pitch room. With a loader capacity in excess of 5 tons per minute the loading operation at this point is quite rapid. Right: loading machine cleaning up at the face. Two trimmers are at work in the background, this being one of the big operations in this mine. It will be noted that good conditions for shuttle-car operation prevail.

DESIGN AND MATERIALS

Help Cut Cost of Preparation Maintenance

With Maintenance of Plant and Equipment a Big Factor in Preparation Cost, Good Design and Selection of Materials in Drawing Up Specifications and Letting Contracts Can Result in Real Savings

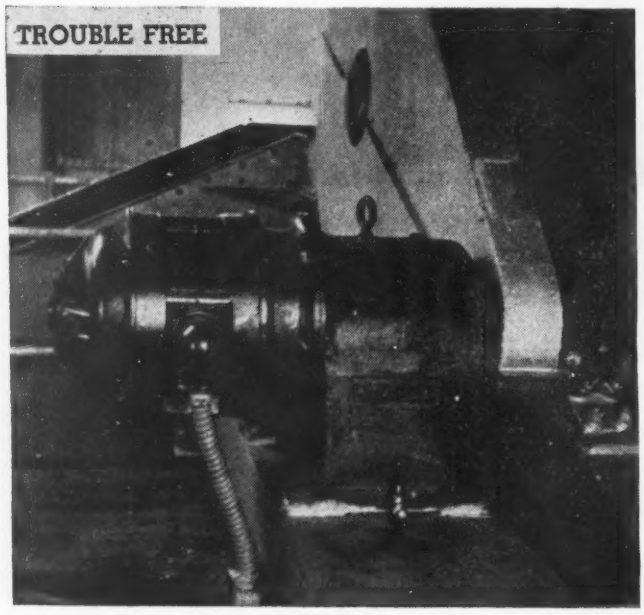
By FRED W. RICHART
Assistant Editor, *Coal Age*

MAINTENANCE is perhaps the largest single factor influencing the efficiency of coal preparation and its cost. Maintenance is not only a substantial item in its own right but its effect on operating time and efficiency greatly influences other preparation costs. How maintenance is set up and carried on naturally has a bearing on final results. Ultimately, however, the possibilities are regulated by the original design and construction of the plant. If it is properly laid out and well built with quality materials, maintenance and efficiency are favored. If the design is indifferent or poor and too little money is allotted for first-class equipment and materials, even the best of maintenance cannot achieve results. For low preparation maintenance, therefore, the place to start is in the design and specifications.

The importance of this conclusion is borne out by available data on maintenance cost and operating time at specific preparation plants. Stating that "the selection and design of the equipment have more influence on later maintenance costs than any other single factor," J. B. Morrow, president, and D. H. Davis, chief chemist, Pittsburgh Coal Co., give data in "Coal Preparation" (A.I.M.E.) on three modern well-built plants where delays due to mechanical breakdowns are less than 1 percent of the total elapsed time. Based on a five-year period, average cost (labor and supplies) of maintaining machinery and equipment in the three plants in question was 9.1 percent of the original cost per year. Individual plant figures were 12.1, 7.6 and 7.3 percent. Cost per ton of mine-run was, respectively, 3.48, 3.65 and 3.80c.; average, 3.58c.

Aside from the structure, the preparation plant comprises mechanical facilities—the cleaning, screening and other machinery; electrical facilities—transformers, motors, wiring, controls and auxiliaries; and power transmission equipment—the link between motors and machines. Materials handled include coal, rock, water and air, not to mention in many operations oils and chemicals. Operating conditions include vibration, dampness, dust, abrasion and corrosion. Men must be provided access to the equipment to operate, inspect, lubricate and maintain it, and provision should be made for easy replacement of parts and units when necessary. Heat, light and other conveniences must be supplied and equipment must be protected from the weather and especially from freezing when water is employed.

All these factors pose a problem for the designer—and for the purchaser as well, because if they are left out of consideration or skimmed over, the plant's efficiency will be less and its maintenance cost higher. As previously stated, the maintenance is largely determined when the contract is signed. Once the plant is built and in operation there is little that can be



Gearmotor drive for raw-coal belt conveyor—saves space, is practically free from trouble and is safer.

Perforated stainless-steel screen plates are less subject to blinding, last longer and screen more accurately.

done, aside from wholesale revision at high cost, to change the original material or improve the quality of the equipment.

The responsibility for both quality of product and cost of maintenance rests on the engineers and executives who decide what to buy. These men should not let the sales angle—important though it is—obscure the fact that production must be had at a reasonable cost for upkeep. Because it promises to do a more nearly perfect job, the desire to select a particular type of cleaner does not imply that a machine of poor mechanical design or constructed of inferior materials need be specified. The purchaser usually has a choice and in many cases an opportunity to specify the best of materials, especially if the plant or equipment is custom-built in whole or in part.

The cleaning equipment normally is the heart of the preparation plant, but it is not the whole plant. Built around and integrated with it is an array of supplementary and auxiliary equipment which together makes up the bulk of the plant. This assembly of auxiliary equipment also is responsible for most of the operating delays and maintenance cost, not to mention its effect on preparation efficiency.

The builders of preparation plants, knowing the effect of good design and good materials on cost and performance, always prefer to do the better job if the buyer will permit. It is up to the buyer interested in a product that will bring his customers back for more to make it possible for the manufacturer to provide the plant that will provide the desired quality—at the lowest cost.

"At the lowest cost" is the usual stumbling block. It means the best of everything even though the initial cost may be a little higher, in contrast to "Why isn't that standard open motor just as good as that splashproof one?"; "What do you want with weatherproof controls; aren't they installed inside?"; "Why do you want the bucket lips hard-faced? Steel is steel, isn't it?"; or "Why specify that expensive alloy for the pumps? Do you want to break the company?"

The man who has to live with a cleaning plant and has to freeze or sweat through the "graveyard" hours to be ready to wash coal the next day finds very little difficulty in answering such questions. Top management and engineers can make his job much easier and save money for the company by seeing to it that the answers are in the contract when it is signed. The difference between a maintenance cost of, say, 6 to 7c. a ton and 4 to 5c. well warrants care in drawing specifications and a reasonable addition to plant cost.

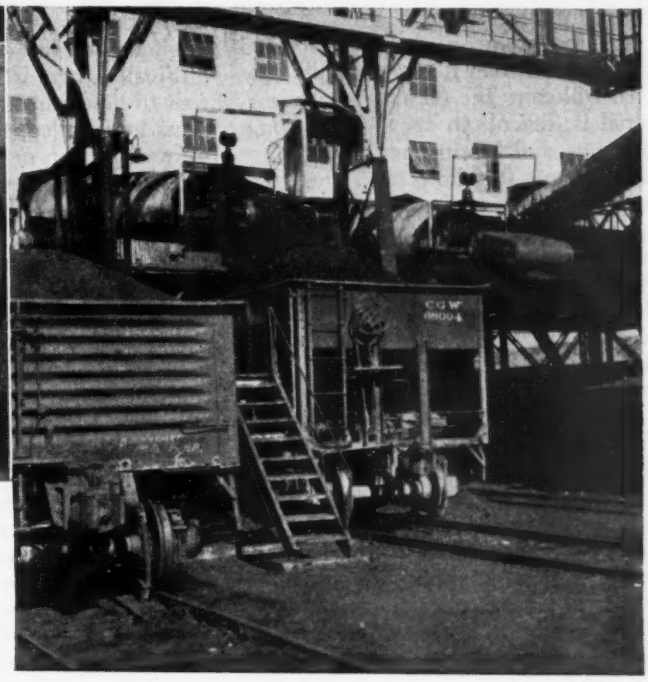
Preparation-plant layouts are almost as numerous as the plants themselves, but several steps can be taken in all to increase efficiency, promote safety and comfort and reduce cost. These include ample clearances and headroom, reducing the chances for injury, making it easier to keep the plant clean, facilitating inspection and lubrication, and making it easier to remove and replace parts and units when necessary.

Permanence and low maintenance cost make concrete and steel almost mandatory—and a little more in the right place often will return dividends many times and slight extra outlay. A steel structure usually lends itself better to modifications made necessary by changing conditions. Concrete in floors and in other places such as stairs often provides advantages equal to or exceeding those characterizing its use in foundations, storage bins and similar facilities.

The list of materials which assure low maintenance also includes special alloys, non-ferrous metals and alloys, rubber, glass, tile, brick, etc., for pumps, valves, screens, conveyor bottoms, chute, bins, tanks and other equipment and facilities, not to mention alloy, asbestos and other special roofings and sidings. Alloys and special metals have earned a well-merited place as maintenance reducers.

Most builders of coal-preparation equipment offer a wide variety of designs, sizes, types and materials, especially in the auxiliary machinery which supplements the cleaning facilities. After 50 years and more of accumulated experience, good designs featured by ample strength and suitable materials are available for all auxiliary processes. In view of this it is difficult to justify, for the small difference in first cost, the use of cheap accessories. With war demands lessening, there is now also no need to resort to "ersatz" in any important facility.

Standardization can help materially in preparation-plant maintenance and, up to the point where it would reduce production or sacrifice quality, should be a major goal in design. Such standardization reduces parts inventories and operating delays. Bearings, shafting, gears and conveyors offer



Above: This nickel-alloy impeller (left) lasted more than a year pumping 500 g.p.m. of slurry carrying 20 percent solids. The liner lasts two years and the pump body five. The material is expensive but its extra cost is more than offset in longer wear. These worn-out impellers are scrapped. Right: belts on these loading booms last around four years.

good opportunities for standardization. Duplication of pumps, motors and controls also provide real advantages in reduced inventory and maintenance expense.

Noise costs money because it represents wear. Neither is it calculated to promote safety. Noise elimination should be a major consideration in plant design, since steps to reduce it also are steps toward more efficient operation and lower maintenance. Gear reducers and gear motors are practically noiseless because of the use of one or more soft pinions, accurate workmanship and operation in oil. V-belts and silent-chain drives also reduce noise output where applicable. Motor pinions of plastics, cotton or other soft materials are silent and often outwear iron or steel. They must be mated with cut gears.

Spraying Coal Helps

Dust is a usual accompaniment of coal preparation. There is evidence that its importance in maintenance is not fully realized. Preferably, the problem should be tackled either by spraying the coal with a dust-allaying agent upon entry into the plant, inclosing equipment to prevent dust escape or installing a dust-collecting and exhausting system. Another line of defense is making accessory equipment, such as motors and controls, tight against the entry of dust. Some new plants built to be dust-free have been found well worth the additional expense in maintenance and better working conditions.

Under conditions prevailing in coal preparation, as in almost any production process, there are spots that are inherently troublesome. Certain bearings, for example, must be located where lubrication is very difficult. Fine coal will carry the oil away, gritty material is difficult to keep out of some bearings, and bearings under water are a problem. It follows that there are wear and erosion in spite of known lubrication methods. A practically perfect example of assured lubrication is the totally inclosed speed reducer. Two of the worst examples are the screw conveyor in the bottom of the jig box and the refuse elevator chain and lower bearings.

Equipment that must handle abrasive materials, whether on a conveyor, in an elevator or suspended in water, is subject to severe wear. Abrasion-resisting steels in conveyors, pipes and cones is the answer in many cases. For some applications, such as chute linings, perforated screens for small coal and dewatering screens, stainless steel or other special metals

Thin plates of stainless steel welded into bottom of chute stop clogging by damp coal.

in alloys help materially. Lower water velocities in pumps and pipes carrying gritty fines reduce erosion as long as material is kept in suspension. Experience indicates that destructive erosion in slurry pipelines is confined to the bottom of the pipe within about one-tenth of the circumference.

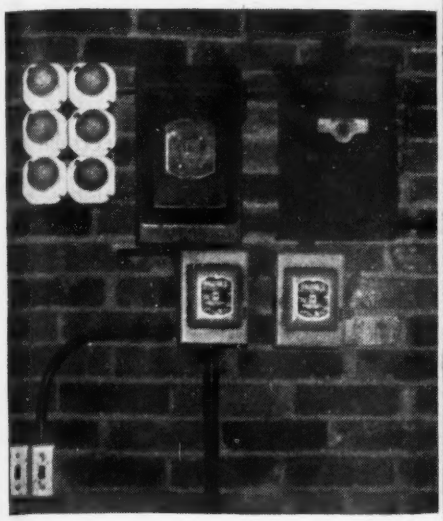
Finally, there is the character of the coal to be cleaned, the impurities that must be handled, the effect of acidity of wash water or chemicals used in the cleaning processes and the final treatment of coal to keep down the dust and prevent freezing. The recovery and disposal of dust and the fine coal in the slurry are increasingly important problems in conservation and profit. If, however, the specifications are properly drawn in letting the contract, much can be done to offset adverse conditions and reduce maintenance and delays due to mechanical failures.

Conveyor bottoms and linings may be designed or redesigned to make renewal easy. Abrasion-resisting steel or alloys may be used to prolong life. Some users put the life of abrasion-resisting steels at 167 percent of carbon steels, saving 40 percent in replacement labor. Linings spot-welded in place rather than plow-bolted make a better job. Butt joints are welded. Since better materials and methods frequently are called upon as maintenance problems mount, they might as well be in the original installation.

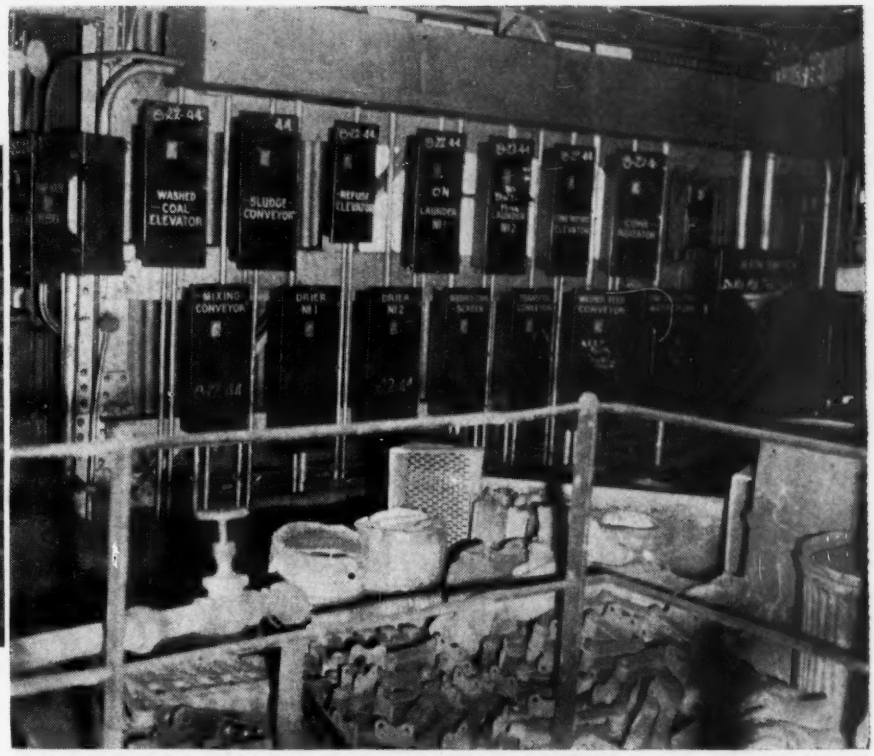
Tipple and washery builders have done a good job of introducing gear reducers to the mining industry. If no other good reason can be found it is enough that they are life preservers. Trains of open gears are noisy, subject to accidental breakage because of loose material falling into them, require gobs of grease with consequent fire hazard, take up a lot of room and are a menace it is well to be rid of. The life of a gear reducer is indefinite when operated within its normal rating.

Tough Lubrication Too

Elevator and conveyor chains are subject to rust and severe link and pin wear. They often are difficult to keep lubricated. Water and wet material wash the lubricant away; dry coal dust absorbs it. When a chain is immersed in dry coal it may be best to let it run dry. There are washery men



A cheap and effective ground detector consisting of six 220-volt lamps, two in series from each leg of the 440-volt circuit to ground. Faults indicated may be run down and remedied at the end of the shift.



This group of linestarters are in dustproof inclosures and are located above water level. Installed in 1938, their record is almost perfect.

who say such a chain can be lubricated some. Others disagree. Experience indicates that the life of a chain in dry coal is three times the life in wet coal. The same is true of conveyor bottoms.

Chain materials are of great importance. In a recent washery, built after the inspection of numerous plants all over the country, the link material adopted was SAE 1045 rolled steel, heat-treated to 385-400 Brinell hardness. In this plant all but two conveyors have duplicate chains and sprockets, regardless of load. They are rebuilt and shifted from heavy to light service as they wear.

Forged alloy heat-treated steel chains of the rivetless type are very popular and have good life. There is one objection to them for loading booms. They carry small coal back from the discharge and drop it on the ground when feeding a mixing conveyor with no car underneath to catch it. The most difficult chain problem is the jig-box refuse elevator. Lubrication is out. The most successful chain to date, in the opinion of many plant operators, is made of cast manganese steel links and pins. Several styles are available. A satisfactory one has every link alike—a bar with a fork on the trailing end. There is less tendency to catch on projections than when the form is a single bar for one link, and a bar with forks on each end for the other link.

The mass-flow type of conveyor-elevator, being totally inclosed, has advantages in handling dust-sized material. The loaded and empty legs are back to back, separated by a single plate, and normally are built in 10-ft. sections. One user has found it advantageous to increase the thickness of the partition plate, to redesign the legs so that the plate may be replaced by merely removing the bolts and to overlap the two legs for stiffness of structure and convenience in making replacements.

Although perhaps not strictly orthodox for a coal washer as yet, a 150-tons-per-hour vertical belt elevator handling coal of minus 2-in. size nevertheless has been put in service. It is a copy of the familiar grain elevator comprising steel buckets attached to a rubber belt. This elevator has been handling dry coal since 1938. Says the foreman: "It has no upkeep cost."

One experienced belt engineer has said that "Belt conveyors cost less than steel, will outlast steel if there is no sulphur in the coal and save two-thirds in power." Rubber-belt-conveyor upkeep cost is low, all users agree. Lubrication of rollers is infrequent and inexpensive. Many belts are mounted on "lubricated-for-life" or "sealed" bearings. Life of sealed bearings has been good in many installations, although there is some adverse opinion. If water or dust gets into them they are short-lived.

Rubber belts are not a cure-all for conveyor troubles. They cannot be used in handling wet material outdoors in winter weather. The pitch usually is limited to 18 deg. for mine-run coal. Sometimes less is desirable. As much as 23 deg. has been used for small coal.

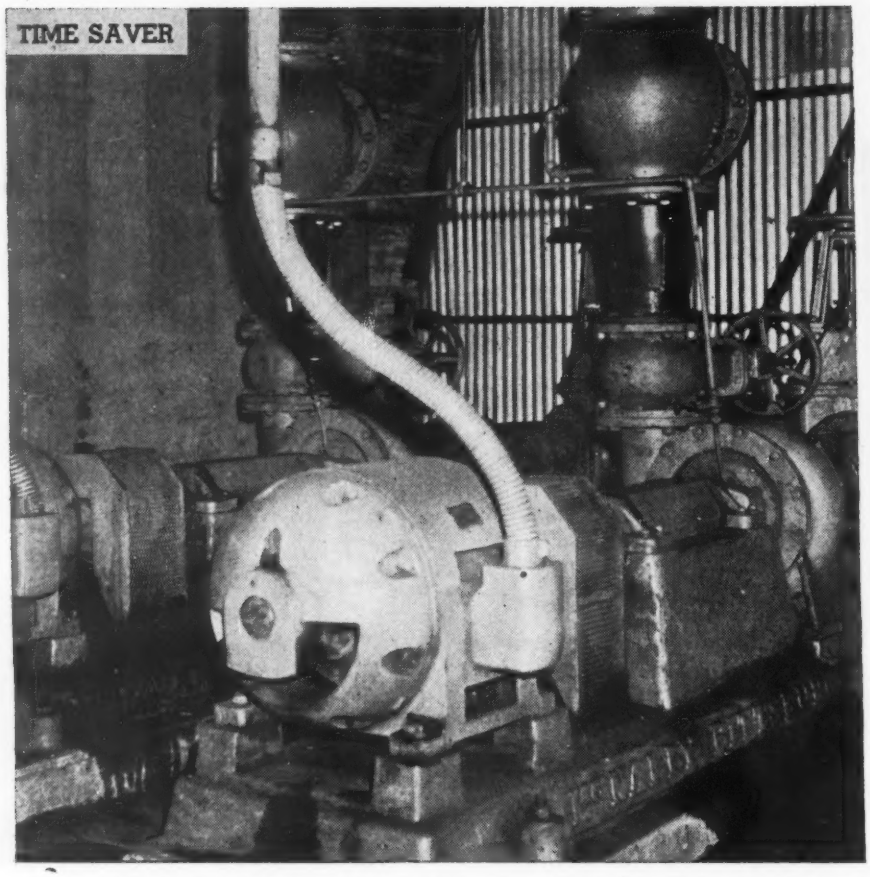
Must Be Well Built

Vibrating screens are a widely used type of equipment with problems of their own in maintenance. Most of these revolve around screen cloth and its installation. Sturdy construction and flexible mounting of the screen body are two essentials. Screen cloth should be the right type for the service and should be solidly installed and supported as necessary to prevent undue wear and quick failure. The secret of screen-cloth life is to keep it solidly in place to prevent the first break.

Stainless steel has found wide use in addition to other special materials for screening fine coal—wet or dry.

One large washery using $\frac{1}{8}$-in. stainless-steel plates with perforations up to $\frac{7}{8}$-in. in its classifying screens gets a life of three times that of $\frac{1}{4}$-in. mild steel plates. Most important, there is no blinding, the sizing is exact and the consist of each size is in keeping with the content of jig-run. Moreover, thin plates do a better job of screening than thick plates. Improved quality of product is the justification for stainless-steel classifying screens at this washery.

One of the major items in a washery is the pumping equipment. Centrif-



These duplicate pumps operate in parallel. Sometimes three or four are used.

ugal pumps as a rule are direct driven by electric motors, but the V-belt drive is gaining in favor. The shaft usually is mounted on ball or roller bearings which carry the impeller truly in accurately machined casings. Here, also, there are exceptions. Some very heavy pumps are equipped with plain, ring-oiled bearings, which are very satisfactory. Removable wear rings permit easy renewal to keep leakage down and efficiency up. The kind of material in the pump body and impeller will be governed by the fluid to be handled and, for a washery, on the solids in suspension as well as the corrosive nature of the liquid.

Replacement Made Easy

Washery pumps get extremely hard service. Some parts are short-lived where bad conditions prevail. Pump builders usually provide for speedy dismantling and reassembly. The impeller has a much shorter life than the pump body, so provision for its easy removal speeds replacement. Such features are a great help.

Duplicate pumps are practically always used for circulating wash water. Where conditions permit, this could well be extended to the slurry pumps. Many emergencies have arisen where a spare at hand has saved the day. The main reason for some recent pump changes has been solely to provide duplicates. V-belt drives simplify such changes. For certain applications, where water requirements are not accurately predictable, a V-belt drive makes it possible to vary the speed merely by pulley change.

The difficulties met where suspended solids are a large factor require some knowledge of these problems. This is particularly true of heavy material such as sand, gob and pyrite. The fact that certain pump manufacturers insist on large slow-speed pumps for such work is called "smart engineering" by one washery operator. The fact that reduced speed of solids greatly reduces the erosion of pump parts and piping seems to be the basic reason for slow-speed pumps where abrasive solids are involved.

Washeries have been known to freeze up. In some cases steam is introduced into the wash water to prevent freezing. Proper roofing and siding will conserve heat. Unit heaters at strategic locations will supply the necessary heat to make the building comfortable for workmen. These heaters should be kept far from dust-treating oil mist. The combination of coal dust and oil mist clogs the radiator, reducing or shutting off the heat.

According to their own testimony, hygienic toilets are appreciated by the maintenance force. Experience of some operations show that it is relatively easy to keep them in first-class condition.

Equipment Improving

Washery builders have made a good start toward better electrical installations—introducing among other things conduit wiring. Opinion seems to be that excluding control wires from bus inclosures speeds trouble shooting. Probably price has been the major factor in slowing installation of inclosed motors and weatherproof controls for locations where they ought to be used. Splashproof motors are fairly safe from dripping water, but not from dust. All washery controls should be in dust-tight weatherproof inclosures, even at double the cost.

Conduits, controls and motors have not always been out of reach of accidental overflows from jig boxes or sluiceways, or from leaks that eventually appear in piping. Many cases of record prove that water or injurious vapors may stop the plant. Shutdowns from water may be greatly minimized by using the correct material or a better location.

Perhaps no preparation plant can be cited as a model in electrical equipment. Undoubtedly there are honest differences of opinion. Collective experience, however, indicates that one cannot go far wrong in including the following items in his new plant: transformers with non-inflammable insulating oil; automatic oil or air-circuit breakers for switching 2,300- and 4,000-volt circuits; individual control for each low-voltage motor, each to include an air-circuit breaker and thermal overload protection and be inclosed in weatherproof dust-tight case; splashproof or, in some locations, totally inclosed motors. Fuses should be eliminated except possibly on the primary side of transformers and for lighting circuits.

The 220- or 440-volt power circuits should be grounded through lamps by a "Y" connection. This will instantly indicate which phase wire in the motor circuit has been grounded, the lamps on that phase going out. The trouble may then be cleared at the end of the shift without shutting down in the meantime.

Lightning protection is always in order. The best system adds a 3-pole capacitor to the usual arrester set at a cost well within the value of the protection. One motor burnout headed off may easily pay for the entire installation.

TONS-PER-MAN RECORD

Proves Worth of Mechanical Coal Loading

What Do Mechanical Loading and Conveying Offer Coal in Increased Efficiency?—Compared to Hand Loading, a Boost of Over 50 Percent in Tons per Man, According to This Special Bureau of Mines Study

By W. H. YOUNG
Chief

And R. L. ANDERSON
Assistant Chief
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U. S. Bureau of Mines
Washington, D. C.

STATISTICS on employment and working time at bituminous-coal mines, as collected by the Bureau of Mines, do not reveal productivity separately on underground output loaded mechanically and by hand due to the inability of the producer to allocate employment. However, a separation has been made that shows comparison between strip mines, underground mines with 90 percent or more of total output loaded mechanically and all other underground mines.

Table I shows the number of mines, production and average tons per man per day, by States, for mines that load 90 percent or more of total output with loading machines in 1943. This table includes only the mines that use mobile loaders, duckbills or scrapers and excludes mines hand-loading onto conveyors or pit-car loaders.

Table II shows similar data for mines that load 90 percent or more of total output with hand-loaded conveyors and pit-car loaders and excludes mines using loading machines. A few mines, using conveyors in conjunction with mobile loaders, have been classed as "mines using loading machines."

A comparison of "average tons per man per day" at mines using loading machines with those using conveyors shows a higher productivity at mines using loading machines in each State for which there were comparable figures. This increase in productivity of loading machines over conveyors varied from 0.15 ton per man per day in Pennsylvania to 3.49 tons in Ohio, with the average as 3.13 for the United States. Comparing productivity in different States, however, conveyor load-

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Table I—Number of Mines, Production, and Output per Man per Day at Underground Bituminous-Coal and Lignite Mines Using Loading Machines in the United States, by States, in 1943[1]

State	Number of Mines	Production, Net Tons	Average Tons per Man per Day
Alabama	7	1,067,431	3.23
Colorado	14	2,056,785	5.34
Illinois	47	39,224,109	8.99
Indiana	22	9,754,685	8.01
Iowa	1	.....[2]	....[2]
Kentucky	38	11,266,458	7.82
Montana (bituminous)	7	1,814,745	7.55
Montana and Texas (lignite)	1	.....[3]	....[3]
New Mexico[2]	1	443,287[2]	4.95[2]
North Dakota[3]	2	351,377[3]	10.22[3]
Ohio	21	12,745,117	6.08
Pennsylvania	39	19,049,460	5.59
Tennessee	1	.....[2]	....[2]
Utah	12	5,146,094	6.57
Virginia	5	706,900	4.62
West Virginia	73	32,246,199	7.96
Wyoming	14	7,528,465	6.90
Total	305	143,401,112	7.29

[1] Includes mines that load 90 percent or more of output with mobile loaders, duckbills and scrapers.
[2] Iowa and Tennessee included with New Mexico.
[3] Montana and Texas lignite included with North Dakota.

Table II—Number of Mines, Production, and Output per Man per Day at Underground Bituminous-Coal and Lignite Mines Using Conveyors in the United States, by States, in 1943[1]

State	Number of Mines	Production, Net Tons	Average Tons per Man per Day
Alabama	9	1,377,731	3.05
Arkansas	20	985,102	2.79
Colorado	10	380,057	3.72
Illinois	2	.....[2]	....[2]
Indiana	1	65,922	5.14
Kentucky	9	837,782	4.56
Maryland	2	178,942	3.37
Ohio	1	35,298	2.59
Oklahoma	9	572,416	2.40
Pennsylvania	16	2,674,619	5.44
Tennessee	6	641,384	4.67
Utah	4	152,151	3.96
Virginia[2]	2	679,535[2]	4.92[2]
Washington	5	686,249	3.22
West Virginia	44	5,653,267	4.81
Wyoming	4	289,570	5.06
Total	144	15,210,025	4.16

[1] Includes mines that load 90 percent or more of output with hand-loaded conveyors and pit-car loaders. [2] Illinois included with Virginia.

Table III—Production, Number of Mines, Employees, Days Active and Output per Man per Day

State	Strip Mines					Underground Mines With 90% or More of Output Mechanically Loaded				
			Average					Average		
	Production Net Tons	Number of Mines	Number of Employees	Number of Days Mines Were Active	Tons per Man per Day	Production Net Tons	Number of Mines	Number of Employees	Number of Days Mines Were Active	Tons per Man per Day
Alabama	427,039	10	338	225	5.61	2,846,290	19	3,595	258	3.07
Alaska	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	302,762	11	193	190	8.26	985,102	20	1,617	218	2.79
Colorado	8,917	1	12	109	6.82	2,793,639	26	2,085	270	4.96
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	16,617,826	38	3,364	263	18.81	45,796,438	58	19,453	273	8.64
Indiana	13,310,466	67	3,547	252	14.91	10,396,671	25	5,551	240	7.79
Iowa	665,588	28	330	235	8.58	.....[1]	1	.....[1]	.....[1]	.....[1]
Kansas	3,033,500	37	1,009	233	12.92	.....	.....	.....	.....	.....
Kentucky	1,945,384	24	719	157	17.21	12,676,327	52	6,550	266	7.26
Maryland	123,723	6	98	120	10.51	178,942	2	185	287	3.37
Michigan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	3,383,990	43	1,088	253	12.30	.....	.....	.....	.....	.....
Montana (bituminous)	2,576,627	1	107	318	75.73	2,005,731	8	994	277	7.29
Montana & Texas (lig.)	131,679	4	28	246	19.09	.....[1]	1	.....[1]	.....[1]	.....[1]
New Mexico	.....	.....	.....	.....	.....	.....[1]	1	.....[1]	.....[1]	.....[1]
North Dakota (lignite)	1,749,722	52	471	213	17.42	.....[1]	2	.....[1]	.....[1]	.....[1]
Ohio	9,489,716	138	2,890	229	14.32	13,831,988	25	8,538	272	5.95
Oklahoma	1,449,244	15	473	250	12.24	740,694	10	954	284	2.74
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	17,993,485	404	7,522	174	13.71	26,148,774	65	17,302	274	5.52
South Dakota (lignite)	39,059	5	23	235	7.22	.....	.....	.....	.....	.....
Tennessee	1,877	1	15	10	12.51	1,093,997	10	942	242	4.80
Texas (bituminous)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	.....	.....	.....	.....	.....	5,767,356	20	2,957	299	6.53
Virginia	.....	.....	.....	.....	.....	1,603,461	10	1,400	264	4.34
Washington	27,134	2	24	73	15.52	700,625	6	791	284	3.11
West Virginia	6,088,271	111	2,596	150	15.66	46,698,706	137	24,762	272	6.92
Wyoming	319,166	6	133	195	12.31	8,582,334	21	4,055	321	6.59
Undistributed	.....	.....	.....	.....	.....	704,954	.....	374	264	7.13
Total	79,685,175	1,004	24,980	211	15.15	183,552,029	519	102,105	272	6.62

[1] Included under "Undistributed."

ing in Pennsylvania was 2.21 tons per man per day higher than loading machines in Alabama. The average annual production of the mines using loading machines was almost five times as great as that at the mines using conveyors.

In addition to the mines shown in Tables I and II (305 using loading machines and 144 using conveyors) there were 70 mines that loaded 24,940,892 tons using both machines and conveyors. The average tons per man per day at these 70 mines was 5.68, and in each State the productivity generally was higher at mines using both loading machines and conveyors than at those with conveyors only and lower than at mines with loading machines only. In Utah, however, productivity at mines using both loading machines and conveyors averaged 7.55 tons per man-day, or 0.98 ton higher than at mines with loading machines only.

The productivity as shown in Tables I and II indicates that loading machines are more efficient than conveyors, but there are many mines where loading machines cannot be used or if used would be less efficient than conveyors. Physical conditions, such as thickness, dip and character of the coal seam, floor, roof and overlying strata, generally determine the type of loading system to be used in a mine and influence greatly the output in tons per man per day.

Table III shows production, number of mines, average number of employees, average number of days mine operated and average tons per man per day in 1943, by States, as well as the total in the United States for strip mines, underground mines where loading is 90 percent or more mechanized and all other underground mines.

Strip mines produced 13.5 percent of the 1943 output. Productivity at

Bituminous and Lignite Mines by Methods of Mining and Loading in the United States, by States, in 1943

All Other Underground Mines					Total All Mines				
		Average					Average		
Production Net Tons	Number of Mines	Number of Employees	Number of Days Mines Were Active	Tons per Man per Day	Production Net Tons	Number of Mines	Number of Employees	Number of Days Mines Were Active	Tons per Man per Day
13,886,991	257	19,341	252	2.85	17,160,320	286	23,274	253	2.92
289,232	5	251	321	3.59	289,232	5	251	321	3.59
11,281	3	31	209	1.74	11,281	3	31	209	1.74
430,071	35	1,020	165	2.56	1,717,935	66	2,830	197	3.08
5,521,636	149	5,350	261	3.95	8,324,192	176	7,447	263	4.24
14,385	1	60	266	.90	14,385	1	60	266	.90
10,217,006	253	9,549	225	4.76	72,631,270	349	32,366	257	8.72
1,357,446	94	1,606	219	3.86	25,064,583	186	10,704	241	9.72
.....[1]	141	.....[1]	.....[1]	.....[1]	2,770,610	170	3,725	196	3.80
403,281	32	997	224	1.80	3,436,781	69	2,006	229	7.50
48,589,762	879	44,679	258	4.21	63,211,473	955	51,948	258	4.72
1,630,715	92	1,787	252	3.62	1,933,380	100	2,070	249	3.75
168,615	5	278	257	2.36	168,615	5	278	257	2.36
925,646	85	1,864	223	2.23	4,309,636	128	2,952	234	6.24
186,308	26	194	230	4.17	4,768,666	35	1,295	273	13.48
.....[1]	13	.....[1]	.....[1]	.....[1]	208,527	18	134	155	10.03
.....[1]	31	.....[1]	.....[1]	.....[1]	1,850,827	32	2,003	285	3.25
.....[1]	52	.....[1]	.....[1]	.....[1]	2,500,202	106	1,002	223	11.17
8,933,289	429	8,794	245	4.14	32,254,993	592	20,222	254	6.27
647,409	57	1,173	230	2.40	2,837,347	82	2,600	253	4.31
1,200	1	6	140	1.43	1,200	1	6	140	1.43
96,907,555	1,365	80,992	273	4.38	141,049,814	1,834	105,816	266	5.01
1,605	2	6	80	3.34	40,664	7	29	203	6.90
6,083,044	169	6,969	240	3.64	7,178,918	180	7,926	239	3.78
9,097	1	26	250	1.40	9,097	1	26	250	1.40
898,580	27	710	274	4.61	6,665,936	47	3,667	294	6.18
18,676,748	126	16,542	278	4.07	20,280,209	136	17,942	277	4.09
799,785	31	848	282	3.35	1,527,544	39	1,663	280	3.28
106,017,332	708	79,906	280	4.74	158,804,309	956	107,264	275	5.38
253,623	28	282	244	3.68	9,155,123	55	4,470	313	6.55
4,078,223	.....	5,661	223	3.24	.....	.....	.....	.....	.....
326,939,865	5,097	288,922	266	4.26	590,177,069	6,620	416,007	264	5.38

strip mines varied from an average of 5.61 tons per man per day in Alabama to 75.73 in Montana, with the United States as 15.15.

There were 519 underground mines that loaded 90 percent or more of their output mechanically in 1943. Productivity at these mines varied from an average of 2.74 tons per man per day in Oklahoma to 8.64 in Illinois, with 6.62 as the average for the United States. This group includes underground mines with mechanical loading ranging from 90 to 100 percent of their total output. If we assume that 95 percent of the total production (183,552,029 tons) of these mines was loaded mechanically, this would amount to 175 million tons, or about 70 percent of the total production actually loaded (249,805,214 tons) with the aid of loading machines (see Tables IV and V).

In each State where the average output per man-day is shown for both strip mines and underground mines with 90 percent and over mechanically loaded, the productivity was greater at the strip mines. Table III also shows that productivity was higher at mechanically loaded mines than at "all other underground mines" in every State except Maryland and Washington.

Fig. 1 shows relative production by methods of mining and underground loading in the ten largest coal-producing States and "all other States" in 1943. These ten States included 83 percent of the total number of mines and produced 93 percent of the total 1943 output. Pennsylvania exceeded all other States in strip production, and West Virginia had the largest output from underground mines with loading mechanized 90 percent or more.

Output per man-day at strip mines

Table IV—Production per Mine at Underground Bituminous-Coal and Lignite Mines

State	Mines Using Mechanical-Loading Devices								
	Mines With 90% or More of Output Mechanically Loaded			Mines With Less Than 90% of Output Mechanically Loaded			Total		
	Number of Mines	Production	Average Annual Production per Mine	Number of Mines	Production	Average Annual Production per Mine	Number of Mines	Production	Average Annual Production per Mine
Alabama	19	2,846,290	149,805	29	10,010,342	345,184	48	12,856,632	267,847
Alaska	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	20	985,102	49,255	2	18,563	9,282	22	1,003,665	45,621
Colorado	26	2,793,639	107,448	28	3,188,995	113,893	54	5,982,634	110,790
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	58	45,796,438	789,594	10	5,069,865	506,987	68	50,866,303	748,034
Indiana	25	10,396,671	415,867	.....	.....	.....	25	10,396,671	415,867
Iowa	1	.....[1]	.....[1]	4	.....[1]	.....[1]	5	432,651	86,530
Kansas	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky	52	12,676,327	243,776	52	17,422,036	335,039	104	30,098,363	289,407
Maryland	2	178,942	89,471	1	216,951	216,951	3	395,893	131,964
Michigan	.....	.....	.....	1	114,199	114,199	1	114,199	114,199
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana (bituminous)	8	.....[1]	.....[1]	1	.....[1]	.....[1]	9	.....[1]	.....[1]
Montana & Texas (lig.)	1	.....[1]	.....[1]	.....	.....	.....	1	.....[1]	.....[1]
New Mexico	1	.....[1]	.....[1]	3	.....[1]	.....[1]	4	1,114,363	278,591
North Dakota (lignite)	2	.....[1]	.....[1]	2	.....[1]	.....[1]	4	521,012	130,253
Ohio	25	13,831,988	553,280	9	2,631,847	292,427	34	16,463,835	484,230
Oklahoma	10	740,694	74,069	1	24,119	24,119	11	764,813	69,528
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	65	26,148,774	402,289	113	47,896,399	423,862	178	74,045,173	415,984
South Dakota (lignite)	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	10	1,093,997	109,400	20	3,034,925	151,746	30	4,128,922	137,631
Texas (bituminous)	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	20	5,767,356	288,368	2	575,554	287,777	22	6,342,910	288,314
Virginia	10	1,603,461	160,346	17	6,075,905	357,406	27	7,679,366	284,421
Washington	6	700,625	116,771	5	319,579	63,916	11	1,020,204	92,746
West Virginia	137	46,698,706	340,866	168	65,152,389	387,812	305	111,851,095	366,725
Wyoming	21	8,582,334	408,683	1	92,217	92,217	22	8,674,551	394,298
Undistributed	.....	2,710,685	225,890	.....	1,397,039	127,004	.....	2,039,698	203,970
Total	519	183,552,029	353,665	469	163,240,924	348,062	988	346,792,953	351,005

[1] Included under "Undistributed."

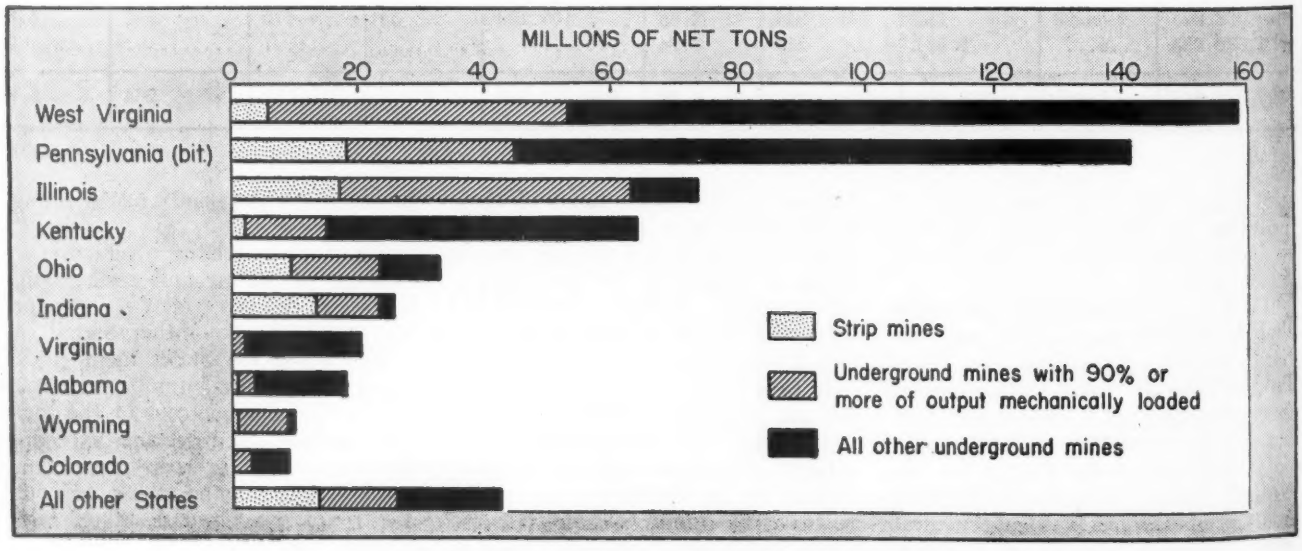


Fig. 1—Production by methods of mining and underground loading in the ten largest and all other coal-producing States in 1943.

Classified by Method of Loading in the United States, by States, in 1943

Mines Without Mechanical Loading Devices			Total		
Number of Mines	Production	Average Annual Production per Mine	Number of Mines	Production	Average Annual Production per Mine
228	3,876,649	17,003	276	16,733,281	60,628
5	289,232	57,846	5	289,232	57,846
3	11,281	3,760	3	11,281	3,760
33	411,508	12,470	55	1,415,173	25,730
121	2,332,641	19,278	175	8,315,275	47,516
1	14,385	14,385	1	14,385	14,385
243	5,147,141	21,182	311	56,013,444	180,108
94	1,357,446	14,441	119	11,754,117	98,774
137	1,672,371	12,207	142	2,105,022	14,824
32	403,281	12,603	32	403,281	12,603
827	31,167,726	37,688	931	61,266,089	65,807
91	1,413,764	15,536	94	1,809,657	19,252
4	54,416	13,604	5	168,615	33,723
85	925,646	10,890	85	925,646	10,890
25	.....[1]	.....[1]	34	2,192,039	64,472
13	.....[1]	.....[1]	14	76,848	5,489
28	736,464	26,302	32	1,850,827	57,838
50	229,468	4,589	54	750,480	13,898
420	6,301,442	15,003	454	22,765,277	50,144
56	623,290	11,130	67	1,388,103	20,718
1	1,200	1,200	1	1,200	1,200
1,252	49,011,156	39,146	1,430	123,056,329	86,053
2	1,605	803	2	1,605	803
149	3,048,119	20,457	179	7,177,041	40,095
1	9,097	9,097	1	9,097	9,097
25	323,026	12,921	47	6,665,936	141,828
109	12,600,843	115,604	136	20,280,209	149,119
26	480,206	18,469	37	1,500,410	40,552
540	40,864,943	75,676	845	152,716,038	180,729
27	161,406	5,978	49	8,835,957	180,326
.....	229,189	6,031	.....	.....	.....
4,628	163,698,941	35,371	5,616	510,491,894	90,900

and underground mines by methods of loading is shown in Fig. 3 for the same States. In this group of the ten largest coal-producing States, productivity (net tons per man-day) was highest in Illinois and lowest in Alabama for each method of mining and loading. Physical conditions are quite different in these two States. Illinois, with its large stripping areas of flat surfaces and practically level coal seams of uniform thickness, is more adapted to strip mining than Alabama, with the hilly or rolling surface over the pitching coal beds of varying seam thickness. Underground mining conditions also are more favorable to high productivity in Illinois than in Alabama. A large percentage of Illinois output is produced from mines with thick coal seams (often 7 ft. or more) and good roof and floor, while practically all of the coal mined in Alabama is produced from mines with difficult physical conditions, such as pitching beds, impurities and varying seam thickness.

During 1943, underground mines in Illinois used 587 loading machines (567 mobile loaders and 20 duckbills) compared with 157 in Alabama (80 mobile loaders, 48 scrapers and 29 duckbills). Illinois also used 129 conveyors (118 pit-car loaders and 11 hand-loaded conveyors) as compared with 375 in Alabama (6 pit-car loaders and 369 hand-loaded conveyors).

Table IV shows the number of mines, production and average annual production per underground mine, classified by method of loading for each State and the total United States in 1943. Production by method of underground loading is shown graphically in Fig. 2 for the ten largest coal-producing States and "all other States."

The average annual production per

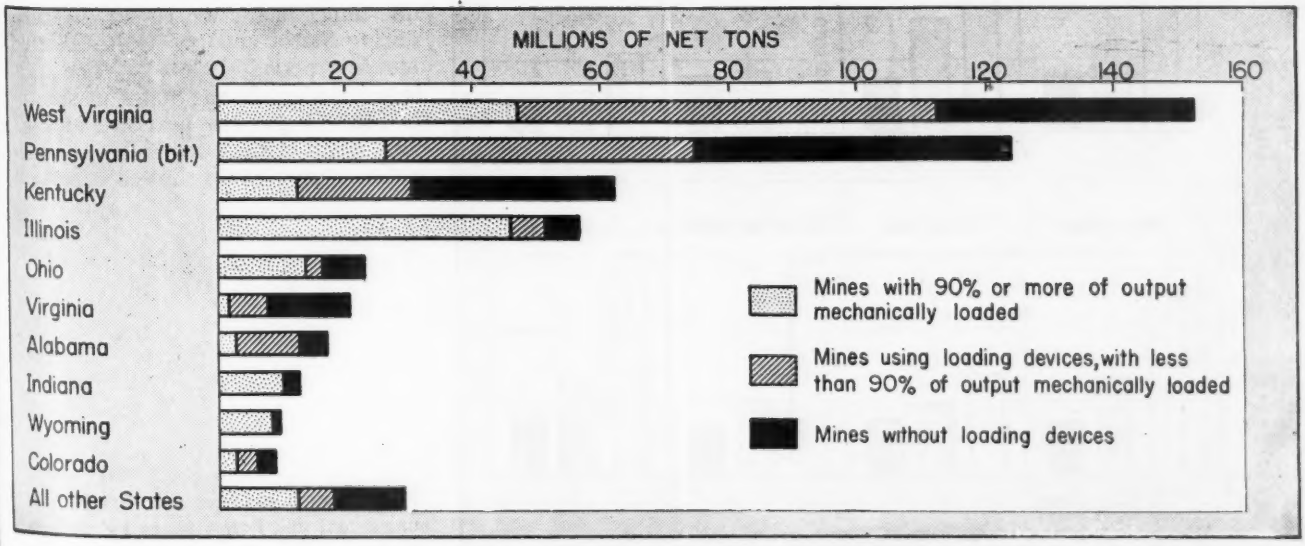


Fig. 2—Underground production by methods of loading in the ten largest and all other coal-producing States in 1943.

Table V—Comparison of Production at Underground Bituminous-Coal and Lignite Mines by Methods of Loading, and Tonnage Actually Loaded Mechanically and by Hand, in the Ten Largest Coal-Producing States, and Total United States in 1943

State	Total Production From Mines Using Loading Devices				Total Production from Mines Without Loading Devices		Production Actually Loaded				Total Underground Production
	From Mines with 90% or More of Total Output Mechanically Loaded		From Mines with Less Than 90% of Total Output Mechanically Loaded				With the Aid of Loading Machines		By Hand		
	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent	Net Tons	Percent	
West Virginia	46,698,706	30.6	65,152,389	42.7	40,864,943	26.7	74,517,853	48.8	78,198,185	51.2	152,716,038
Pennsylvania	26,148,774	21.3	47,896,399	38.9	49,011,156	39.8	42,653,020	34.7	80,403,309	65.3	123,056,329
Kentucky	12,676,327	20.7	17,422,036	28.4	31,167,726	50.9	19,583,421	32.0	41,682,668	68.0	61,266,089
Illinois	45,796,438	81.8	5,069,865	9.0	5,147,141	9.2	47,420,744	84.7	8,592,700	15.3	56,013,444
Ohio	13,831,988	60.7	2,631,847	11.6	6,301,442	27.7	15,320,808	67.3	7,444,469	32.7	22,765,277
Virginia	1,603,461	7.9	6,075,905	30.0	12,600,843	62.1	4,703,124	23.2	15,577,085	76.8	20,280,209
Alabama	2,846,290	17.0	10,010,342	59.8	3,876,649	23.2	8,328,455	49.8	8,404,826	50.2	16,733,281
Indiana	10,396,671	88.5	.....	....	1,357,446	11.5	10,393,430	88.4	1,360,687	11.6	11,754,117
Wyoming	8,582,334	97.1	92,217	1.1	161,406	1.8	8,612,806	97.5	223,151	2.5	8,835,957
Colorado	2,793,639	33.6	3,188,995	38.4	2,332,641	28.0	3,933,952	47.3	4,381,323	52.7	8,315,275
All other States	12,177,401	42.4	5,700,929	19.8	10,877,548	37.8	14,337,601	49.9	14,418,277	50.1	28,755,878
Total	183,552,029	36.0	163,240,924	32.0	163,698,941	32.0	249,805,214	48.9	260,686,680	51.1	510,491,894

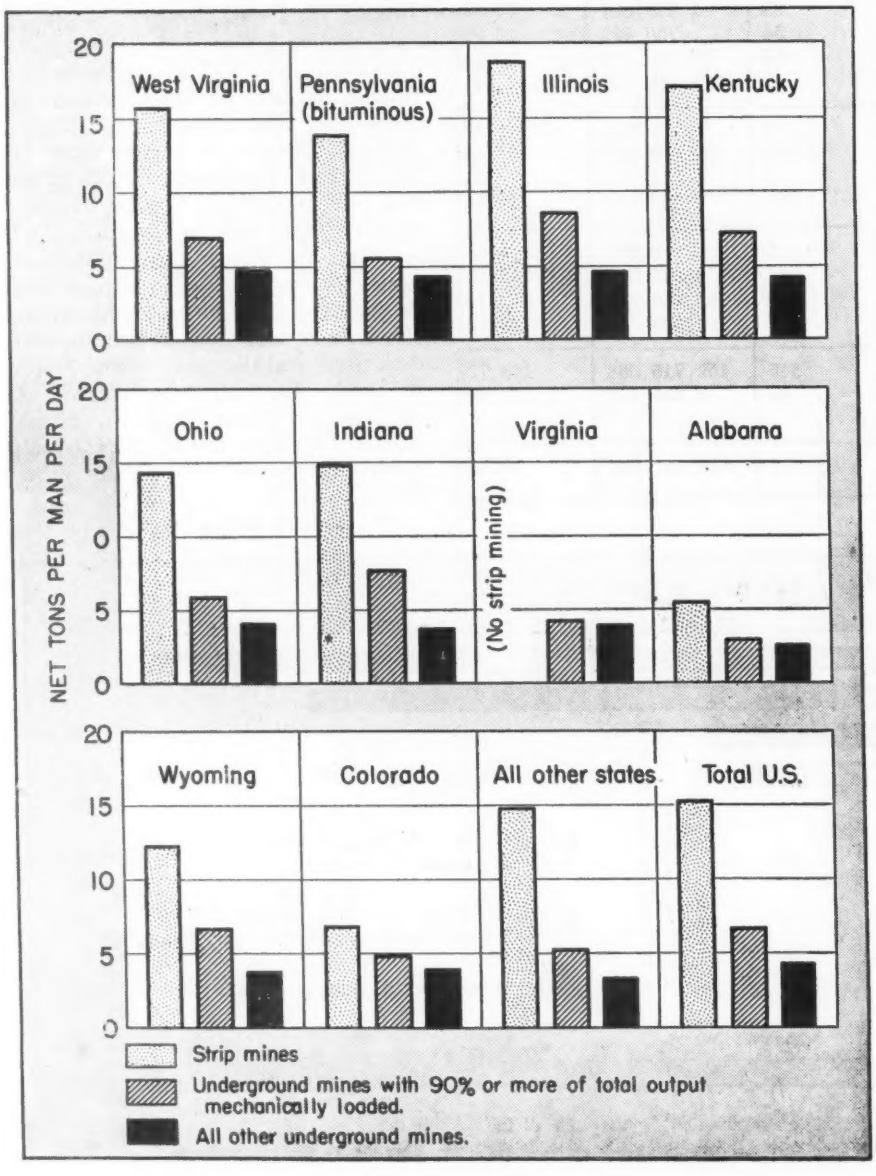


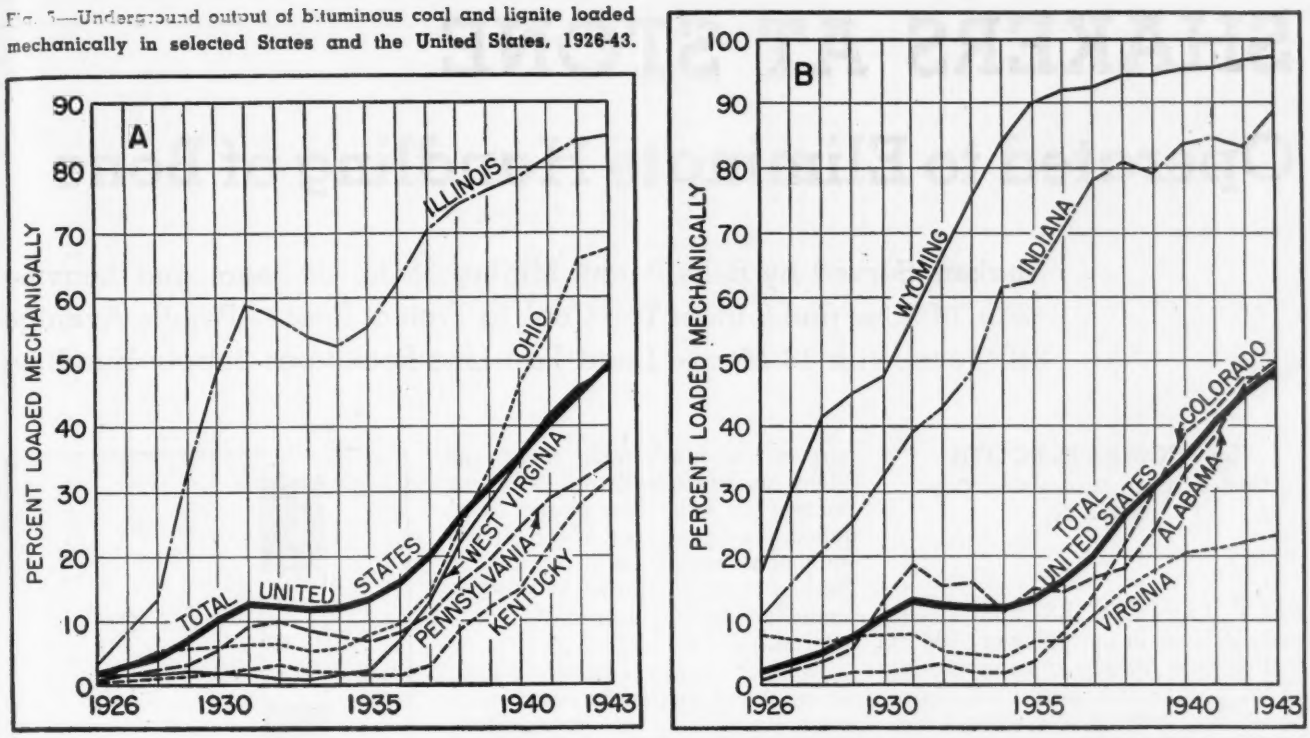
Fig. 3—Output per man per day at bituminous-coal and lignite mines by methods of mining and underground loading in the ten largest coal-producing States and the entire United States.

mine at mines using loading devices was about ten times as large as that at mines without loading devices.

The average size of mines using loading devices appears to be related to the percentage of output loaded mechanically. In each State where the percentage of underground output loaded mechanically was more than 50 percent (Illinois, Ohio, Indiana and Wyoming) the average annual production per mine was larger for mines with loading mechanized 90 percent and over than at mines with less than 90 percent mechanized loading (see Figs. 4, 5A and 5 B).

Figs. 5A and 5B show the percentage of underground output loaded mechanically at bituminous-coal and lignite mines in the ten largest coal-producing States and the United States for the period 1926-43. The five largest coal-producing States are shown in Fig. 5A and the next five in Fig. 5B. Eight of these ten States and the entire United States showed decreases

Fig. 3—Underground output of bituminous coal and lignite loaded mechanically in selected States and the United States, 1926-43.



in percentage loaded mechanically for certain years during the profound business depression. Three States—Wyoming, Indiana, and Illinois—appear to be leveling off, but so many factors can change the trend that it would not be safe to predict either the year or percentage where the maximum will be reached.

Table V compares the 1943 underground production figures used throughout this discussion with figures showing tonnage actually loaded by machines and by hand in the ten largest coal-producing States and total United States. The first group of figures, which is divided into three sections, is equal to the second group, which shows "production actually loaded" with the aid of machines and by hand. The tonnage shown in each of the two groups is equal to the "Total underground production." Figures comparable to this second group have been published for many years in the Minerals Yearbook.

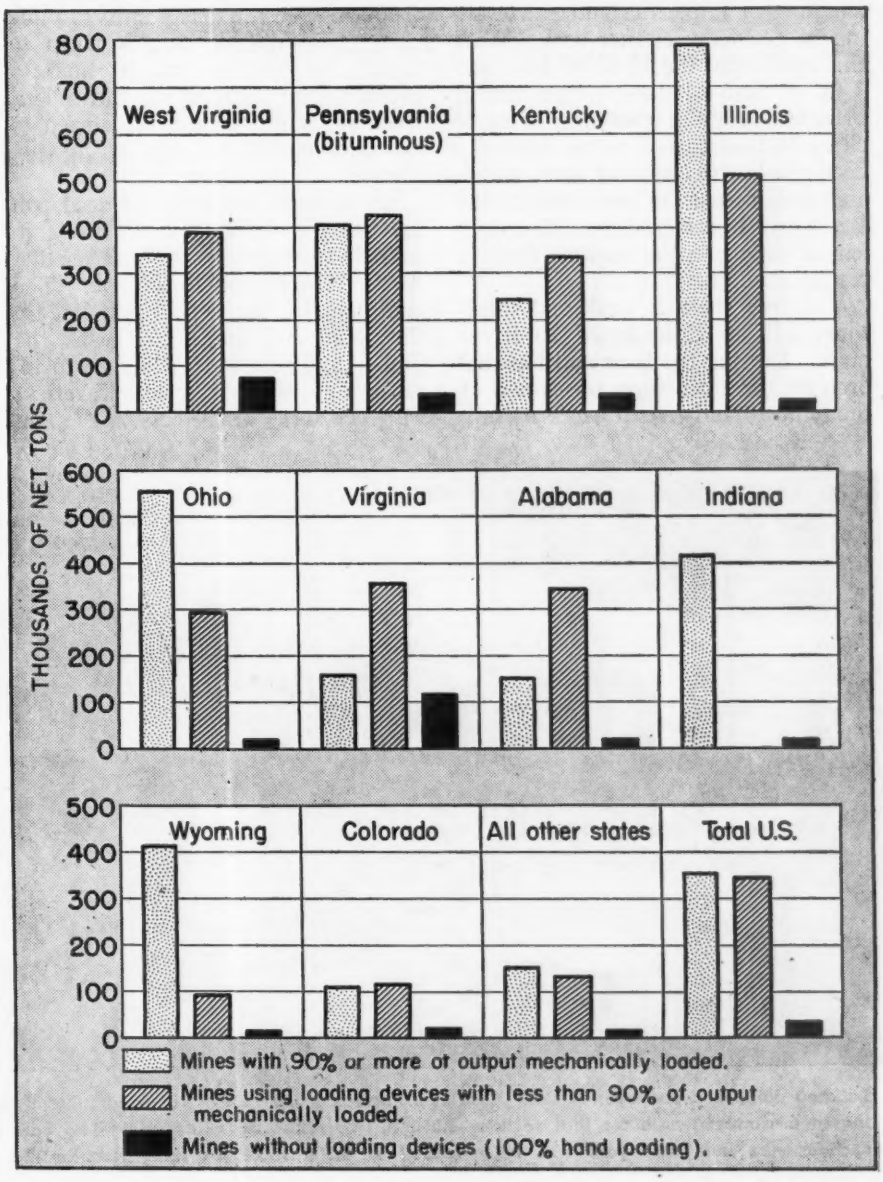


Fig. 4—Average annual production per underground mine by methods of loading in the ten largest coal-producing States and the entire United States in 1943.

SHAKERS AT STONE

Operated to Eliminate Handling of Bone

Shakers Served by Belts Permit Mining 35 In. of Seam and Leaving 12 In. of Bone and 3 In. of Top Coal to Protect Roof — Panels Average 210 Tons With 18 Men — Dead Pan Line Facilitates Supply Handling

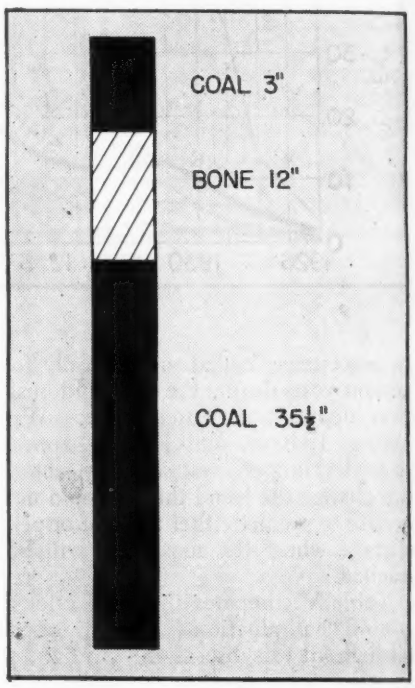
By THOMAS H. BOOTH
Chief Engineer, Eastern Coal Corp.
Stone, Ky.

BELT CONVEYORS and shaker units installed in the spring of 1944 to replace hand loading in some sections at No. 8 mine of Eastern Coal Corp., Stone, Ky., have greatly reduced the handling of impurities and are resulting in decidedly cleaner coal. With this equipment the 12 in. of bone and 3 in. of high-ash top coal are left in place and only the remaining 35 in. of clean bottom coal is taken. Use of a dead pan line to transport pans, cradles and timber from the room neck to the face solves to a large extent the problem of supplying the working faces in conveyor mining.

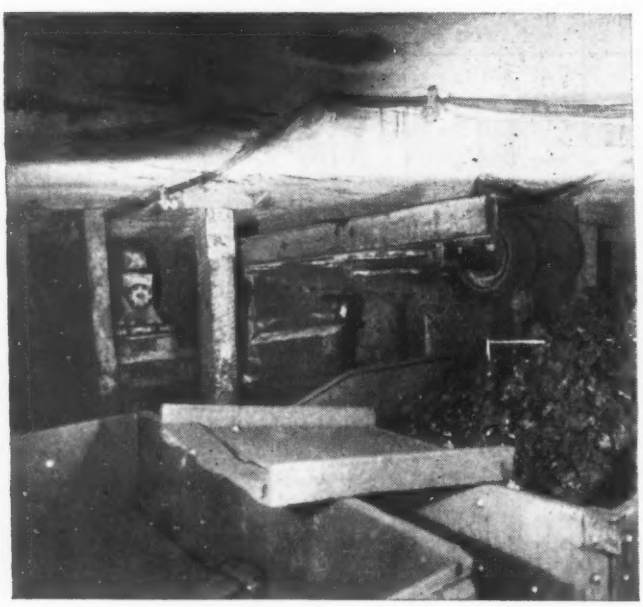
The roof shale is weak and sometimes falls to a height of 10 ft. or more. Leaving the bone and top coal protects the shale from the action of the mine air and gives it necessary support so that much wider rooms and pillars can be worked, thus increasing tonnage per fall. Less powder is required per square foot of face, fewer equipment moves are necessary and the loss of time incurred in stopping production to cut, drill and shoot is reduced.

The belt conveyors in No. 8 mine are employed to transport the coal a maximum distance of approximately 2,000 ft. from the shaker units to mine cars. Considerable care is taken to install the belts in straight lines to prevent their running off the rollers. Even so, training idlers are affixed to the sides at intervals required by conditions.

As its name implies, the dead pan line consists of a line of pans connected together but not on cradles and not connected to a drive. The pans parallel the active pan line in the room and are loaded with the timbers and accessories necessary to advance a room 18 ft. wide and retreat with a 70-ft. wing. As the room

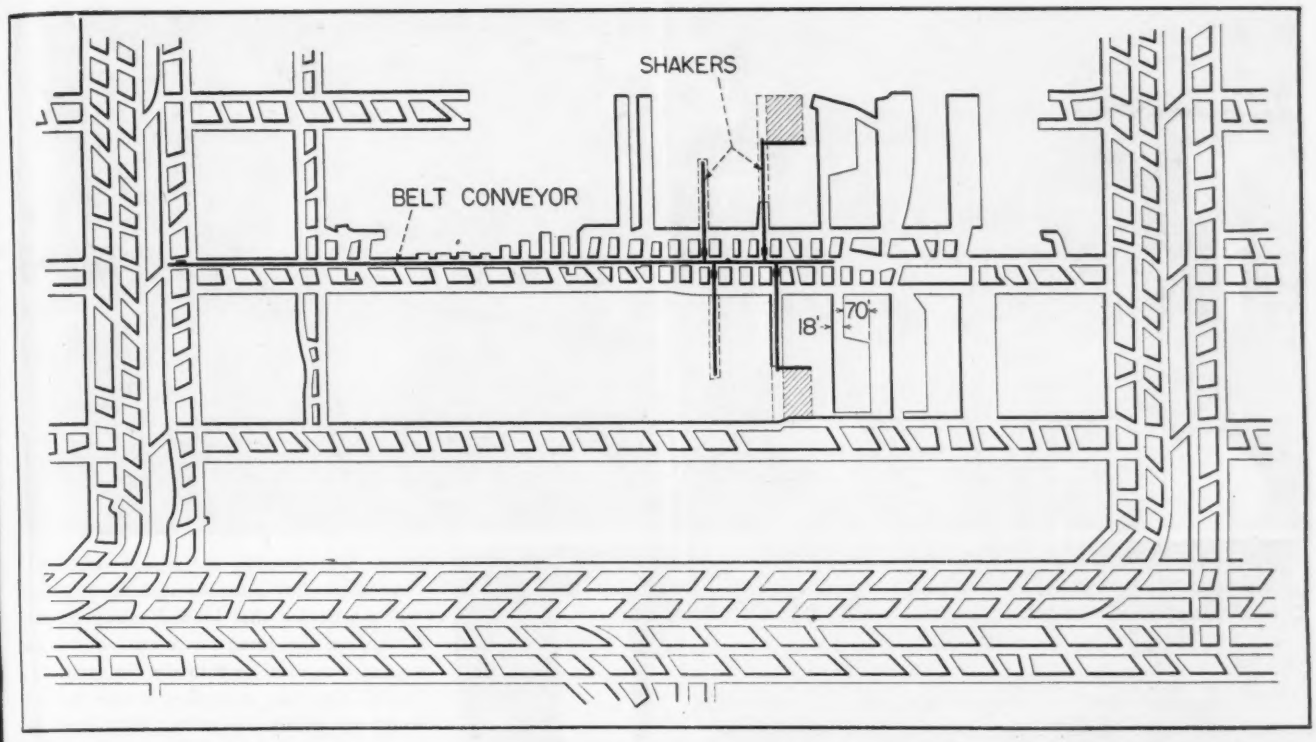


Average seam section in No. 8 mine.



Loading point in a conveyor section. This 26-in. belt is working at maximum length for that section—1,950 ft. In future sections, the belt conveyors will be extended to 2,500 ft.

Looking inby at the point where the change from hand loading into cars to conveyor work took place. Beginning here, the 15 in. of bone and top coal are left in place.



Layout of belt and shaker section. Rooms are driven up to 18 ft. wide and 70 ft. of pillar is mined on the retreat.

advances this pan line is dragged forward by the cutting machine. When a pan and its load of supplies are used at the face, another pan with supplies is added at the room neck. That goes on until the room has advanced beyond the half-way point, after which sufficient pans and material already are in the dead line to complete the place. This system results in a low-cost and trouble-free supply delivery to the face.

The seam at No. 8 mine averages 50½ in. in thickness, bone and top coal included. It is overlain by shale ranging from 2 in. to 10 ft., above which is 2 to 20 ft. of sandstone. The total overburden reaches 1,000 ft. in places. The seam carries the band of bone (12 in. thick) at a point 3 in. from the top. Long life is assured this mine by large reserve acreages ahead of the present workings.

Shaker conveyors are operated both with and without duckbills. For the most part the rooms are advanced and the pillar slab brought back by the use of shakers only. Duckbills are being put into use as reliable, steady-working crews become available through selection and training to the skill required. Some of the mine development is done with mobile loaders, both Clarkson and Joy.

Room shaker discharging to the belt.

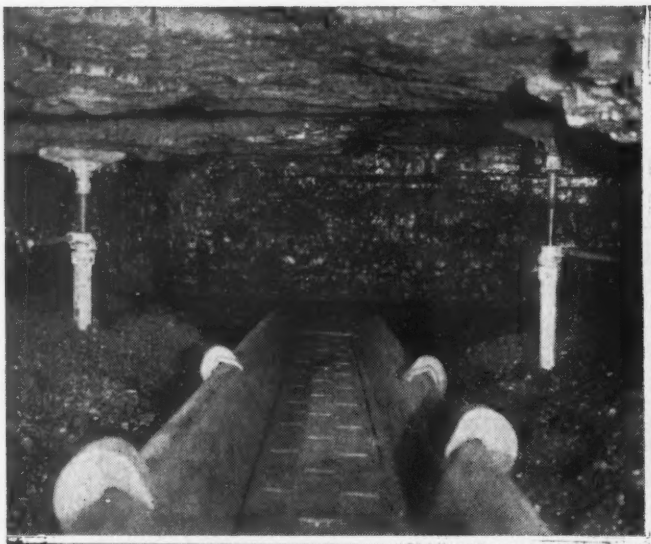
Mining is by a room-and-pillar system which avoids roof breaks that would disturb overlying coal seams and cause breaks to the surface. Recovery is such that surface breaks are prevented.

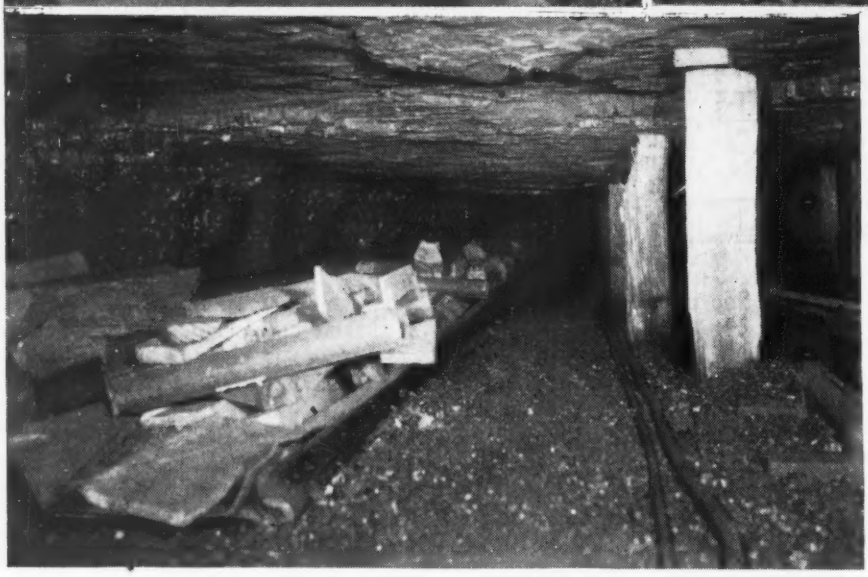
From main entries and at intervals up to 2,000 ft. flat entries consisting of five parallel headings are driven to full seam height. The butt or room entries are turned at 600-ft. intervals. All headings are 18 ft. wide on 60-ft. centers. On the advance, two headings constitute the room entry. Rooms are driven from both sides and the first breakthroughs along one side line up to form a third heading, making the entry a "triple." The three parallel headings are now being driven at the same time. The belt is installed in the center of these three.

Retreat on 70-Ft. Face

With hand-loaded shakers, rooms are advanced 18 ft. wide on 140-ft. centers to a depth of approximately 300 ft. Then, using a shaker face conveyor powered by a bellcrank from the end of the room shaker, a 70-ft. face is mined back to the entry.

Four of the room units, two on each





Above left: room in 33-in. coal—undercut, bugdusted, flat pan inserted in the kerf and the center shot loaded ready to fire. Clamps in the foreground are on the extension pan used next to the flat pan. Above: flat pan of shaker under the cut ready for firing the center shot—coal 33 in. thick.

Left: dead pan line being loaded with timbers and conveyor cradles in a room being driven 18 ft. wide. The line is pulled forward by the cutting machine. At the right is the active pan line. Cables on the floor are for control (two-conductor No. 12) and power (No. 2 duplex).

side of the panel, discharge to a belt. The shaker drives are Goodman Type G-15 with Westinghouse 250-volt d.c. motors controlled by Ohio Brass starters. Power is carried from the room necks to Ohio Brass portable junction boxes by a No. 2 duplex rubber cable. Another duplex cable, size No. 12, also is laid on the bottom to a portable snap switch at the face and used for starting and stopping the shaker drive. Extra cable lengths during room advance and retreat are coiled in "Fig. 8" fashion on the bottom and no cables are allowed near the blower tubing ventilating the room.

When driving the room a flat-nosed telescoping pan, connected to the shaker line by four clamps, is extended under the cut to its full depth before the room is shot. In that way about 10 percent of the fall is loaded automatically. Wooden cap pieces bolted to the Simplex jacks used as safety posts at the face save time in setting up and make for safer work.

The face shaker, driven by roof jack and bellcrank, is 70 ft. long. Posts normally are set on 4-ft. centers each way and rooms do not cave after the mining.

New Sullivan Type 11-B shortwall cutters with 7½-ft. bars were purchased for the conveyor work. Drilling is done with Chicago Pneumatic No. 472 hand-held electric drills and the shooting with du Pont permissible. Three holes are used per face in the advance work and a hole every 10 ft. in the retreat face.

Section Averages 210 Tons

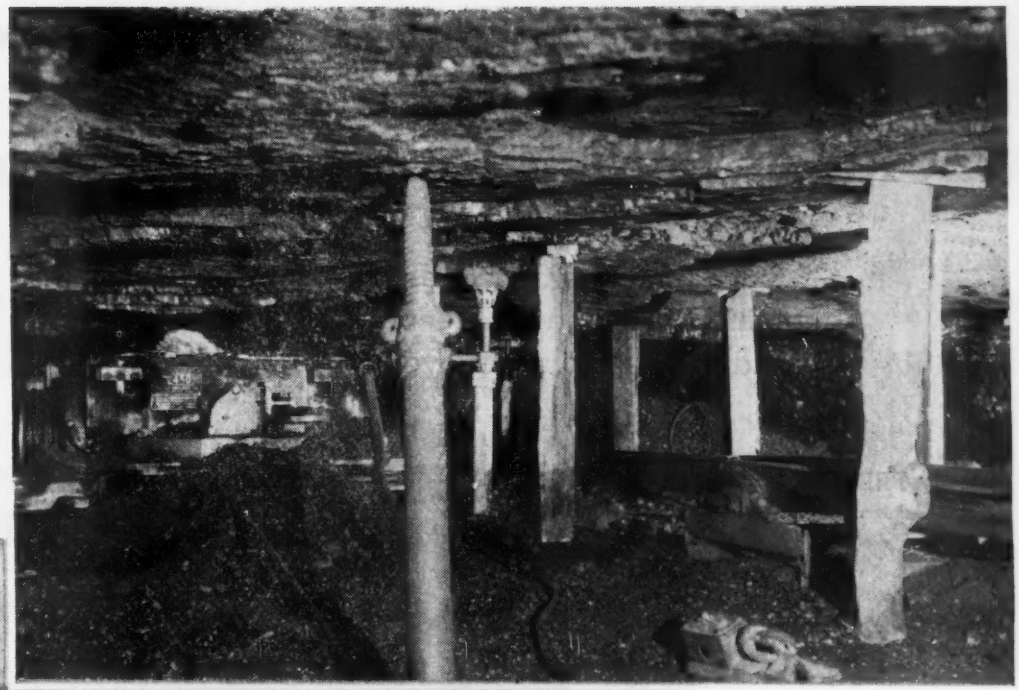
A room crew, on both advance and retreat, consists of four men who do cutting, drilling, bugdusting, timbering, shooting and loading. A belt section panel with its four room crews, boom man and section foreman, averages 210 tons per shift and the mines are worked two shifts. Mine cars, conveyor-loaded, carry an average of 3.2 tons.

Supplies are delivered from belt discharge points to room necks on the third or off shift by reversing the belts. These room-entry conveyors, furnished by Jeffrey, are equipped with 26-in. Goodyear belts.

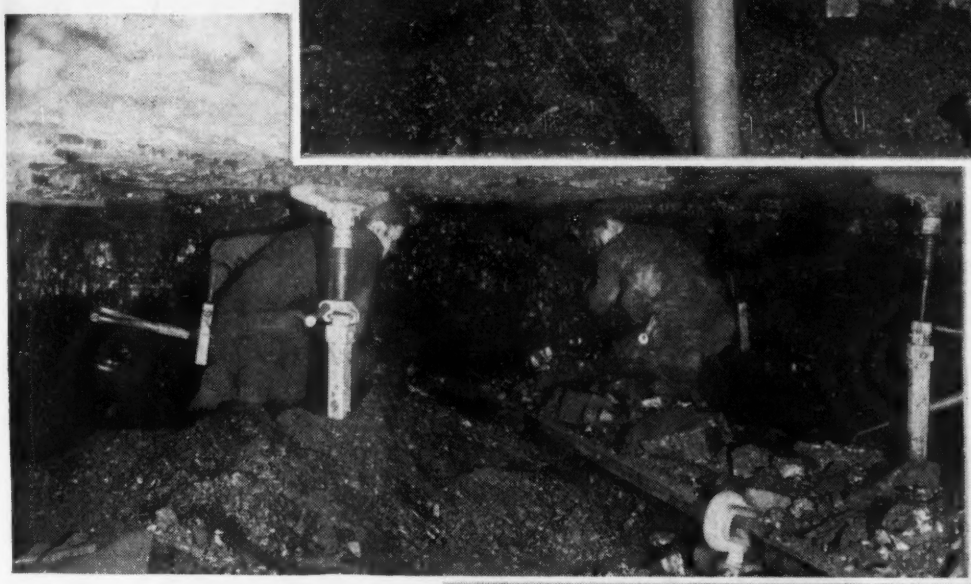
Each belt drive has two Ohio Brass starters—one an automatic for normal operation and the other a manual unit for reversed-duty supply delivery. Cars are spotted by a Vulcan hoist and to facilitate changes without spillage the boom man places a flat board with low sides across the ends of the cars.

Safety is regarded as an important phase of operations. The men are required to wear hard hats and hard-toed shoes. Electric cap lamps are Edison Model P. Through monthly meetings the men are trained in avoidance of unsafe practices and drilled in keeping safety as uppermost in their minds. First-aid courses are regularly maintained. Men are encouraged to take a deep interest in mine rescue work, and such teams are put through a constant course of training.

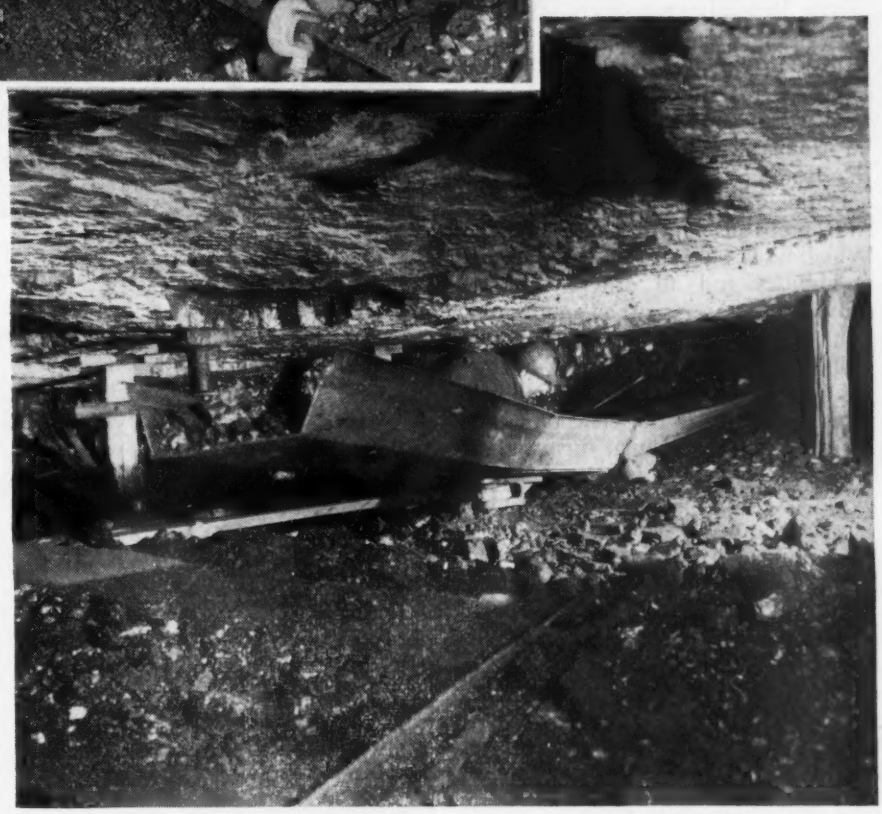
Stone is on Pond Creek in Pike County, Kentucky, about six miles from Williamson, W. Va., which is just across the State line. The seam



Right: one of the eight new cutters in an 18-ft. room in 33-in. coal. Steel jacks have cap pieces permanently attached. On the bottom in the right foreground is the remote-control switch for the shaker drive. Cutter and drill cables come from a junction box just outby the photo.



Left: center shot fired, bringing the coal down on the flat pan. Shaker has been started. Although the coal here is 33 in. thick, range over the mine is 28 to 42 in.



Retreat work bringing back a 70-ft. wing after a room is driven up. View is from near the rib inby the end of the room shaker. Face shaker is driven by a bellcrank. Coal thickness here is 32 in.

mined is the Freeburn, which lies practically level and outcrops at tipple height at No. 8 mine, which is two miles up the creek from Stone. The Eastern Coal Corp., headed by Laurence E. Tierney Jr., president, and Lewis C. Tierney, vice president, both with offices in Bluefield, W. Va., operates three mines in the Freeburn seam in the vicinity of Stone. This company shipped 1,530,000 tons of high-volatile bituminous coal in 1944.

No. 8 Mine Officials

Officials at No. 8 mine include William Ford, superintendent; Harold Brogan, general mine foreman; and Algia Hughes, mine electrician. Frank Kerr is general manager of the operations of the Eastern Coal Corp.; W. E. Wheeler is assistant general manager; T. H. Booth is chief engineer and Claude Helms is chief electrician. All commercial coal produced by Eastern Coal Corp. is marketed exclusively by Eastern Coal Sales Co., Bluefield, W. Va.

FREEMAN MODERNIZATION
Includes Hydraulic Mine Transfer Station

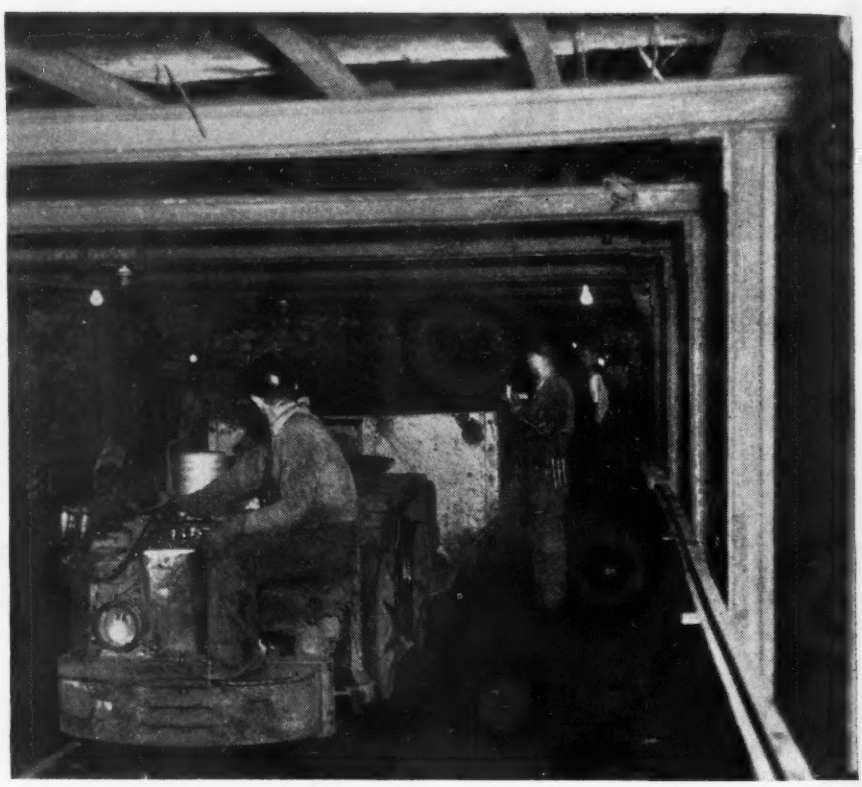
Big 7-Ton Cars and Hydraulic Transfer Station to Serve Loading Machines Included in Freeman Modernization—Haulage, Safety, Surface and Preparation Improvements Heighten Quality and Raise Efficiency

By FRED W. RICHART
Assistant Editor, Coal Age

MODERNIZATION and mechanical mining have paid out at numerous mines in recent years. Both have been employed in converting the Bobby Dick mine of the Freeman Coal Mining Corp., Herrin, Ill., from an operation based on hand loading, small pit cars and poor surface buildings, but with a fairly modern tipple, an up-to-date hoist and a big reserve of thick coal, into an efficient well-equipped operation with the maximum of conveniences on the surface and up-to-date mechanical mining underground. Track loaders and cutters, 7-ton cars and a hydraulic transfer station are outstanding items in the new underground production picture.

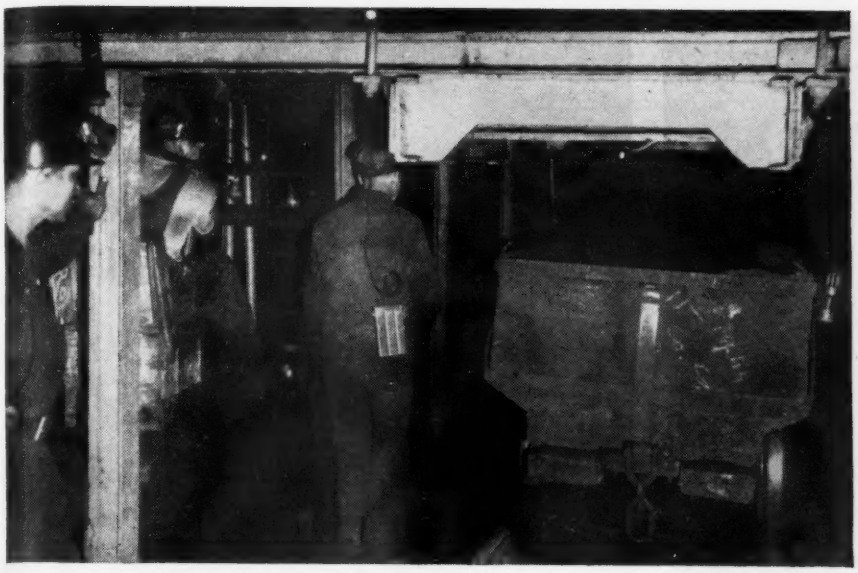
"Modernization" means much more than just mechanical mining. Stretching from the room face to the end of the loading boom, it includes every operation necessary in producing coal and preparing it for the market. Warehouses, shops, office facilities, bathhouses and all other employee conveniences are a part of modernization. Nothing can be omitted that leads to a better product, lower cost, less physical work or better employee relations. Such is the viewpoint that has guided the Freeman organization in its improvement program, which, in effect, was similar to putting a man through a hospital clinic.

For Freeman, modernization underground meant a revision of all face operations, increased power supply, improved haulage and a hydraulically controlled transfer station. On the surface, it included better preparation of stoker coal, a shed to keep tamping clay dry, improved explosives storage and a series of new buildings. The latter include supply and shop facilities to maintain the new underground equipment, a sanitary bathhouse with controlled water tempera-

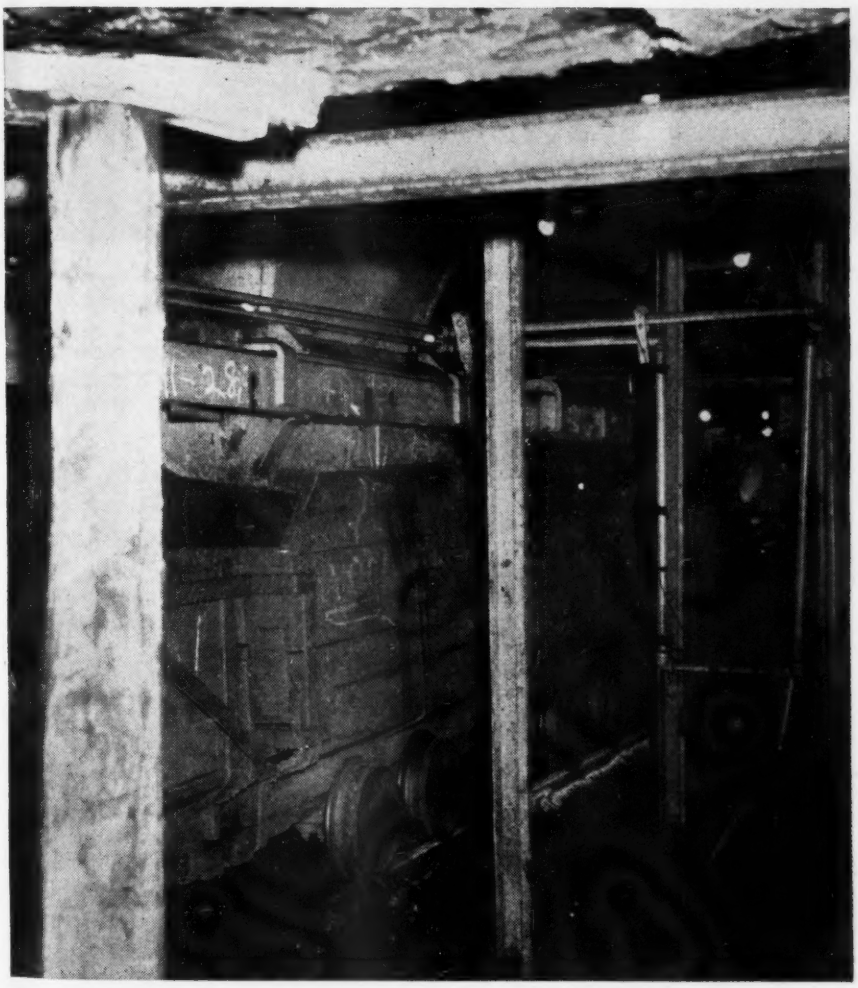


Dumping the 7-ton cars which serve the track loaders at the underground transfer station. The unit under the platform consists of two 10-hp. conveyors.

Inclined 15-hp. conveyor, one of two laid side by side, filling the 2½-ton receiving hopper.



Receiving hopper filling a 2½-ton car for the trip to the surface via hoisting shaft.



Side view of receiving hopper showing supporting beams which also act as tracks for the gate wheels. View also shows spill guards.

ture and a central heating plant, to be topped off with a new office building matching the rest of the group.

All except the office building are in daily use. Supply service and accounting have been put on a sound footing, maintenance is better done, losses in manpower have been overcome, coal output has been increased and the stage has been set for much higher tonnages. Results already are favorably reflected in the cost sheet.

Mine workings at present comprise two sections some distance apart. The older section is being worked out, while the newer is located in line with future developments. The new section is set up for long-time operation, is equipped with large pit cars for gathering and is provided with a new transfer station radically departing from the customary design. The main-line haul from the new section is approximately 1¾ miles. In both sections shortwall equipment has been replaced by track-mounted cutting machines, two of which also shear. Hand units have given way to post-mounted electric drills and track-mounted loading machines have ousted the miner's shovel.

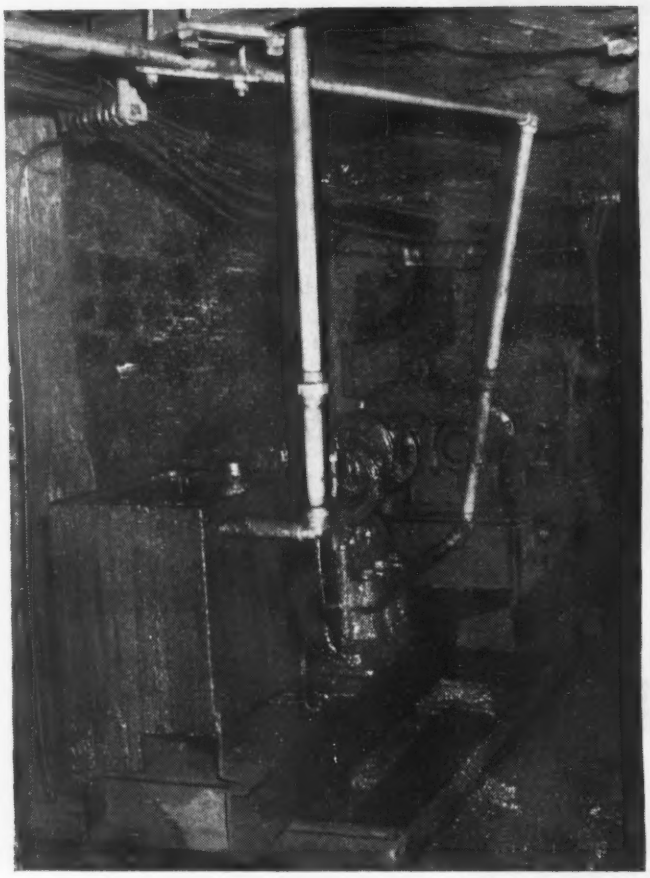
In sheared rooms four holes 8 ft. deep are drilled on each side of the shearing cut. Bottom holes are shot with two 9-oz. sticks of du Pont Monobel AA permissible, and the two top holes with three sticks of the same. The shot holes are tamped with Sealtite tamping bags, machine-filled with fine dry clay.

New Loading System

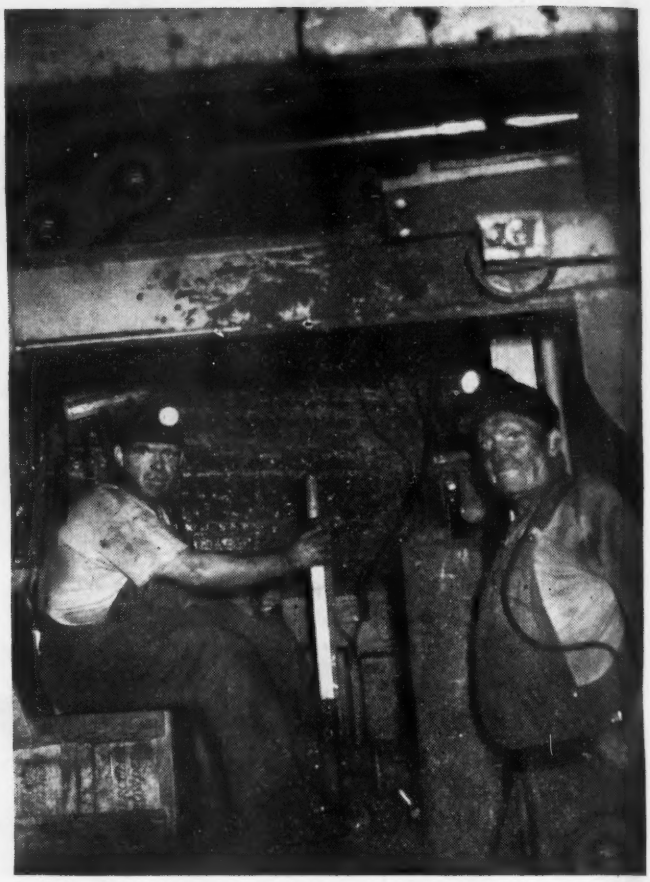
The older section is served by four storage-battery gathering locomotives and the regular 2-ton pit cars, which are switched to the "branch" when loaded and assembled into trips for movement to the hoisting shaft. Cutting in this section is handled by Goodman 324-AA track-mounted machines (8-ft. bars and 9-position chains) which undercut but do not shear. The two loaders in this section are Jeffrey DD. When it is worked out, the equipment will be transferred to the new section, where all loading will conform to methods now in use there.

In the new section a new system of loading and gathering has been set up. To increase actual loading time 7-ton Sanford-Day Timken-bearing automatic drop-bottom cars are used to move coal from the loading machine to an electro-hydraulic transfer station, where the main-line trips of 2-ton cars are loaded. The 7-ton cars stand 48 in. above the rail, which, with the height available, provides ample clearance for the loading-machine conveyor. Five cable-reel locomotives serve the three loading machines now working in this section.

This set-up has been found to provide a number of advantages. Car-change frequency is cut to one-third, coal is saved because spillage is eliminated in loading the larger cars and more than 100 tons of underground storage capacity has been added. The latter provides that much more run-



Hydraulic pump and storage tank for operating the transfer station.

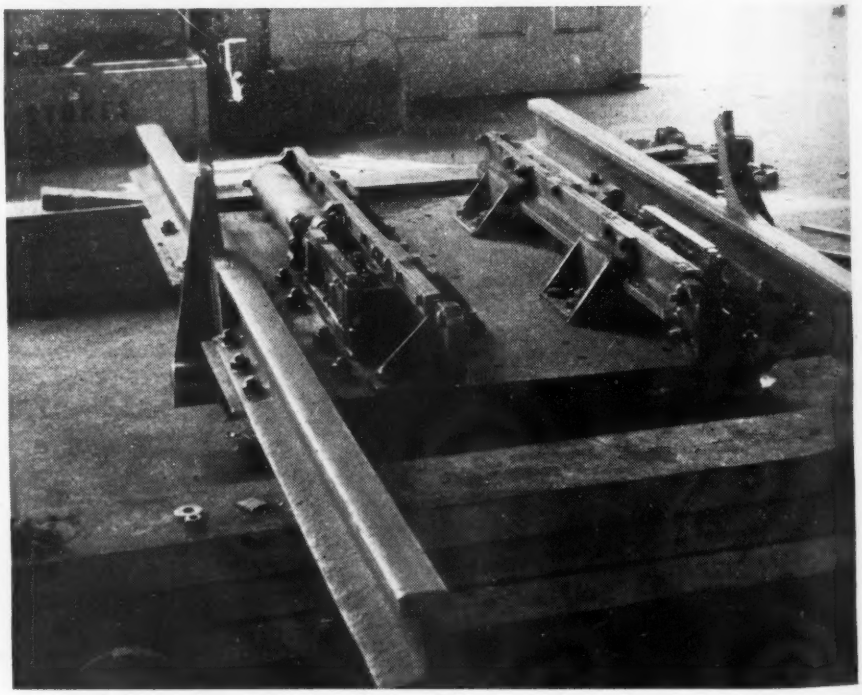


Electro-hydraulic control station. One gate wheel shows at top.

ning time for the shift in case of tipple, hoist or railway-car delays. A further advantage is that trips are not broken inside the mine, saving locomotive time and avoiding flying switches and car coupling, thereby promoting safety and efficiency.

Jeffrey 29-LE track-mounted cutting machines with 8-ft. bars and 10-position chains cut and shear all rooms in this section. Drilling is done with Jeffrey A-6 post-mounted equipment, and loading with two Goodman 460-AH and one Jeffrey L-400 track-mounted machines. These and all other coal producing equipment are driven by 250-volt d.c. motors.

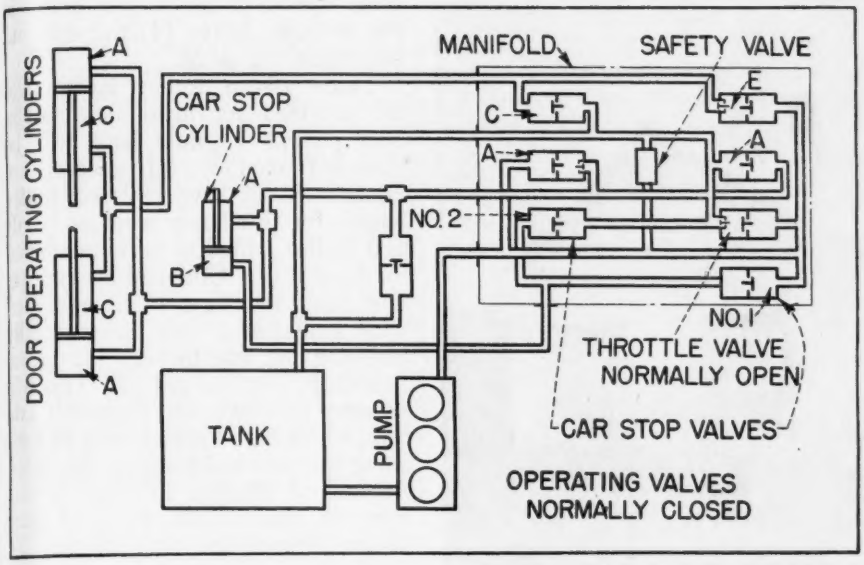
The outstanding feature of this mechanical-mining set-up is the tailor-made electro-hydraulic transfer station. This station receives coal from the 7-ton automatics and loads it into trips of 2-ton cars. It was conceived by General Superintendent Frank H. Seymour, designed and built by the Goodman Mfg. Co. and assembled and installed by the mine mechanics.

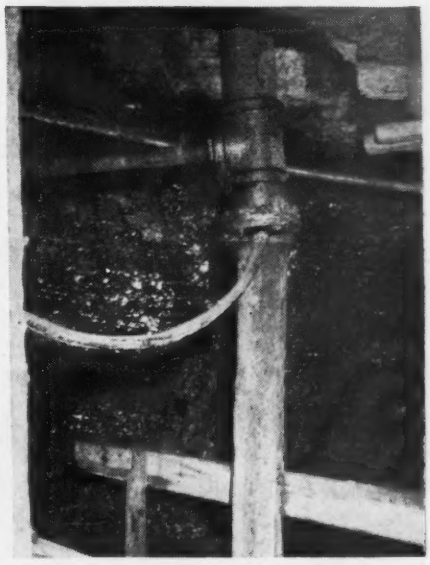


Hydraulic car stop before installation underground in the transfer station.

The unit is made up of seven principal items: electrically driven horizontal receiving conveyor, electrically driven inclined hopper conveyor (at right angles to the receiving conveyor), 2½-ton receiving hopper, hydraulically operated hopper gates, hydraulically controlled car stop, electrically driven triplex pump and the control system. The storage capacity of the two conveyors and the hopper is 32 tons. That, with one gathering trip of two 7-ton cars, is sufficient to fill a 22-car trip for the hoisting shaft.

Each of the two conveyors is made up of two independently driven single-strand center-chain steel-flight units. Each unit is driven by a 250-volt d.c. motor through a worm-gear speed reducer and can be operated independently at reduced capacity in case of





Hydraulic control piping diagram. Right—Bottom of borehole showing water-cooled power cable.

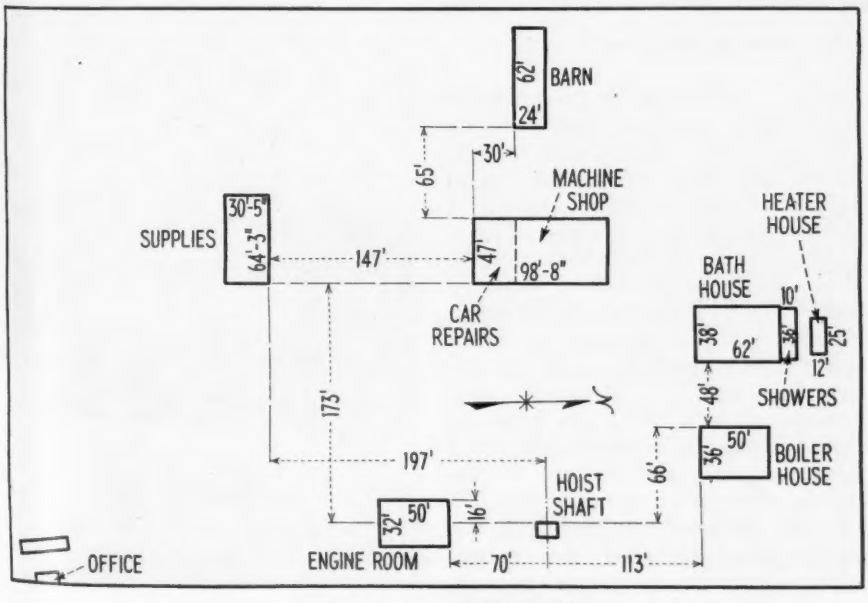
failure of its companion conveyor. The four units may be controlled as one, or in any combination, by cutting out one or more with hand-operated switches. The horizontal units are driven by 10-hp. and the inclined units by 15-hp. motors.

The hopper serves as a reservoir from which to fill a 2-ton car in seconds of time. It is shaped like an inverted pyramid with the tip cut off, and has hydraulically operated gates fitted to the bottom.

The double gates move in opposite directions to open and meet at the center when closed. Each gate is directly connected to the piston rod of a hydraulic cylinder. Their movement, both opening and closing, is smooth and fast without hitches and without noise. The gates ride on small wheels which roll along the flanges of the steel supporting beams.

Directly under the gates and attached to the supporting base is a pair of spill guards slightly farther apart than the width of the gate. These confine the coal within the car width and make loading very exact, while preventing any side spillage. During its travel to the hoisting shaft coal in the car settles about 3 in.

The hydraulic car stop (see accompanying illustration) spots cars at the exact position for quick loading without spillage. The wheel stops are strong enough to stop and hold the trip, including the locomotive, as the motorman eases it along. The trip is held or released as needed by the station operator. Sometimes trip movement and gate operation are so well synchronized that the car stop is scarcely used at all.



Surface layout at Bobby Dick.

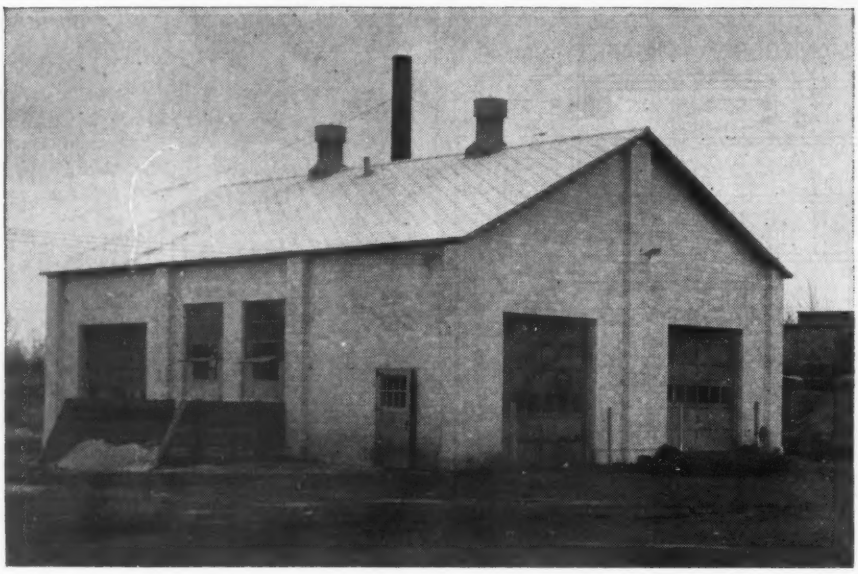
The electrically driven triplex pump is an adaptation of equipment used on the Goodman power shovel. It has a working pressure of 800 to 1,000 lb. per square inch and is fitted with a valve to bypass the water when not called for. It is driven by a 35-hp. motor.

The control system is a combination of electrical and hydraulic devices. As previously stated, any combination of conveyor units may be pushbutton-operated, the combination being set up by hand-operated switches and the group started or stopped by pushbutton. The hydraulic pump is operated by a small drum controller. A series of incandescent lamps, extending beyond the trip length, signals the motorman to go or stop; one flash to stop, two to go. Flashing lamps in the motor circuits indicate to the operator which conveyor units are running. The hydraulic control for gates and the car stop also is from an old Goodman power shovel.

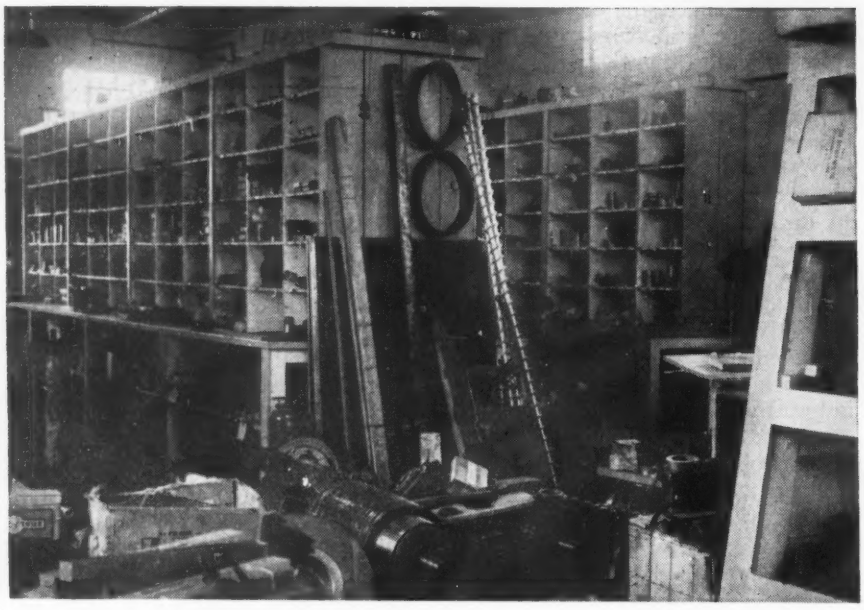
In brief, the transfer station functions as follows: two-car trips from the loading machine automatically dump coal into the horizontal conveyors under the track. Using the various controls, the station operator fills the trip of 2-ton cars and highballs the motorman on his way. If coal is plentiful, the time has been perhaps four minutes. The triprider sets the section signals along the main line from his locomotive, and the trip quickly arrives at the shaft bottom.

Spillage Kept Low

Based on an estimated rate of 12 seconds for loading a 2-ton car, the station has a capacity of 600 tons per hour. In actual service, at the rate



Construction of the surface buildings is shown in this view of the heating plant. It includes glazed tile, steel sash and asbestos roof.



The supply house is fitted with wooden storage bins.

of 15 seconds per car, the action is very leisurely and the loading accurate. Extremely little coal is spilled; not more than a few shovelfuls for a 20- or 25-car trip. The station will more than handle the output of the mine.

Spillage at the face, which amounted to 300 tons a day while loading directly into small cars, has been eliminated, along with the cost of cleaning up by hand. This alone goes a long way toward defraying the cost of making the changes in face operations and installing the transfer station. The output is up a ton per man-day. The release for other work of the men who had to clean up after the loading machines is a real accomplishment aside from the money cost.

The original 2-ton pit cars will continue to be used for the main-line haul. These have been equipped with new Timken roller-bearing trucks which accomplish marked savings in lubrication and locomotive power. A distinct advantage is the ease of moving cars by hand when that must be done. Car capacity will be increased to 2½ tons by adding sideboards when all loading is in 7-ton cars.

Retaining these 2-ton pit cars for main-line haul was done for four reasons: (1) the shaft and hoist are both too small to accommodate much larger cars; (2) the delivery of new cars in quantity is practically out; (3) the 200 on hand, together with the twelve 7-ton cars and the transfer station, provide a storage capacity totaling 600 tons, or enough to continue operation for several hours in case of tipple delays; (4) the steel and investment are saved.

Three 10-ton trolley locomotives are provided for main-line haulage. The present 1¾-mile haul will be extended as the coal reserves are mined. Shoes have replaced trolley wheels for this heavy work and only 6/0 trolley wire has been purchased for some years. One used locomotive, now being rebuilt, is to be equipped with long-sleeved axle liners totally inclosing the axle to keep the grease in and the dirt and grit out. This will do away with two- and three-bolt axle caps, which have the bad habit of loosening the nuts and breaking the bolts. Because of effective lubrication, this type of construction preserves gear center distances and prolongs gear life indefinitely.

Original lightweight main-line track has been rebuilt with 60-lb. rails. Each joint is bonded with one short 4/0 arc-welded bond applied to the outside of the rail head and the track is cross-bonded every 150 ft. Untreated 5x6-in. wood ties are used. Long curves and hand-operated split switches are features that permit good speed and promote smooth trip operation. In wet spots, crushed rock ballast makes a firm foundation. Elsewhere, gob ballast maintains good track conditions.

Congestion Minimized

Passing tracks are located at intervals of 1,600 to 3,200 ft. The two end sections are short. This obviates congestion by permitting the empty trip to reach its first passing track quickly. It also permits the empty

trip to reach the transfer station by the time the loaded trip is ready to move. The several sections thus established are protected from two-way traffic interference by hand-operated electric signals that bar trains which do not have the green light. Hand caging with step-on-release dogs is the present practice.

A 300-kw. 2,300-volt a.c. 275-volt d.c. motor generator supplies power to the new section at present. The old section is supplied by a smaller set. To meet the power needs of the coming consolidation into one section a 500-kw. ignitron rectifier will soon replace both m.g. sets, leaving them free for use along the main haulage, for emergency or for transfer to a sister mine. These conversion units are all underground. Suitable cables are suspended down boreholes to deliver central-station power.

Like most rectifier units recently put into mining service, the new unit is of the "sealed-tube" type, which means simplified construction and operation. The cooling system is the same as automobile engine cooling, requiring only a small quantity of make-up water. The thermostatically controlled fan runs only when the water is above a certain temperature. An accompanying illustration shows how the conduit for a 5,000-volt borehole cable is placed inside the discharge pipe of a mine pump. This double use of a borehole keeps the cable cool.

Bobby Dick is a medium-depth operation as Illinois mines go, but some gas is produced. This is swept out by good ventilation based on a five-heading entry in the new workings and on a duplicate drive for the ventilating fan. The fan house is built of brick.

Edison cap lamps are used by all underground men and are racked and charged in a lamproom in one corner of the new washhouse. This arrangement is very convenient for miners as they go into the mine and return from work.

Directional indicating signs are posted at entries leading to important parts of the mine. For example: "To the Escape Shaft." In addition to large plain wording on the sign boards, they are cut in the form of arrows to indicate the correct direction.

First-aid stations supplied with material for prompt treatment of minor injuries are located on the bottom near the hoisting shaft and in each working section of the mine. They are marked with a red cross on the door of each cupboard.

A new fireproof powder magazine, a similar fuse storage building and a storage shed for dry clay, all set well apart and far from other mine structures, constitute the facilities for storing and protecting materials by the shotfirers. The protection of explosives is a recognized necessity; dry clay for dummies is considered another necessity at this mine.

In keeping with the trend of the times and to meet the increased demand for stoker coal, preparation facilities have been supplemented by equipment for crushing the larger sizes and dedusting the household stoker output. The deduster is a Selectro vibrating screen with long-mesh cloth to take out the minus 10-mesh material. These refinements are designed to make a basically satisfactory coal give even greater satisfaction to the user.

Four Buildings Added

Surface improvements also have been extended to take in four new buildings for greater convenience, higher efficiency and added safety. These consist of a heating plant, washhouse, repair shop and supply house. These are built around the end and one side of a hollow square, facing in. The tipple and hoist house fill the other side, while the opposite end is left open for an entrance to the grounds.

The new buildings have concrete foundations with walls of buff tile glazed inside and out. The walls are 8 in. thick, with piers to stiffen the ends and corners and to support the steel roof trusses. The window sash are steel cemented solidly into the

FREEMAN PERSONNEL

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Frank H. Seymour	**General Superintendent**	**Emanuel A. Lindsay**	**Top Foreman**
Roland Wilson	**Mine Superintendent**	**John R. Smith**	**Master Mechanic**
Van E. Austin	**Mine Manager**	**Eugene Stewart**	**Supply Clerk**
Walter J. Longman	**Chief Electrician**	**Geraldine Kirk**	**Chief Clerk**
Marshal Aiken	**Mining Engineer**	**Violet Vickers**	**Assistant Clerk**

Surface buildings at Bobby Dick mine.

The modern washhouse includes a dressing room (left) and shower room (right).

wall. Doors and frames are wood. The floors are concrete. The three truck doors of the heating plant are of vertical opening garage type. All others are hung on hinges or rollers, depending on the size and on the service. Solid wood sheeting laid on wooden purlins supports the asbestos-shingled roof. Use of glazed-tile walls makes for a pleasing appearance. They will never require painting and driving rains will wash off the dust and soot and keep them clean.

The central heating plant supplies steam for heating all buildings except the office, and for pumping and warming the bath water. A hand-fired locomotive-type-firebox boiler generates the steam. Modine steam radiators are used to heat all buildings. Those in the shop are vertical and are suspended near the roof. All others are set horizontally. The heating plant also houses the sand dryer and the dummy-filling machine.

The sand bin has steam pipes near the bottom so that only dry sand appears on the floor. The fireman fills the sand cars by hand shoveling, screening out the trash and pebbles as he goes along. The electrically driven tamping bag filler is tended by a man whose job is to keep ahead of the daily needs. He packs the filled bags in carrying crates.

The bathhouse has a shower room at the north end with eight showers. The water temperature is thermostatically controlled. The supply tank is housed in a small building at the rear. The large central room is reserved for dressing and is fitted with benches, chain suspension clothes hooks and swinging entrance doors (one swinging in and the other out). The concrete floors are hosed off daily. At the southwest corner is the lamp room. In the southeast corner is the washroom for foremen and face bosses.

Shop Promotes Efficiency

The repair shop houses machinists, welders, blacksmith and carpenters, all in one room. The windows are large and the lighting good. Several large doors, the swinging center sash and several roof ventilators provide good ventilation in hot weather. A mine track from the tipple and the yard runs into and across the shop, making it convenient to handle material in and out.

Like many others built in war days, this shop does not yet have a full complement of tools. The service nevertheless is good. This is in part accounted for by the fact that more and better work can be done in a comfortable shop. A portable crane inside and chain blocks and a roofed chain hoist in the yard are aids in loading trucks and cars for moving material about the shop.

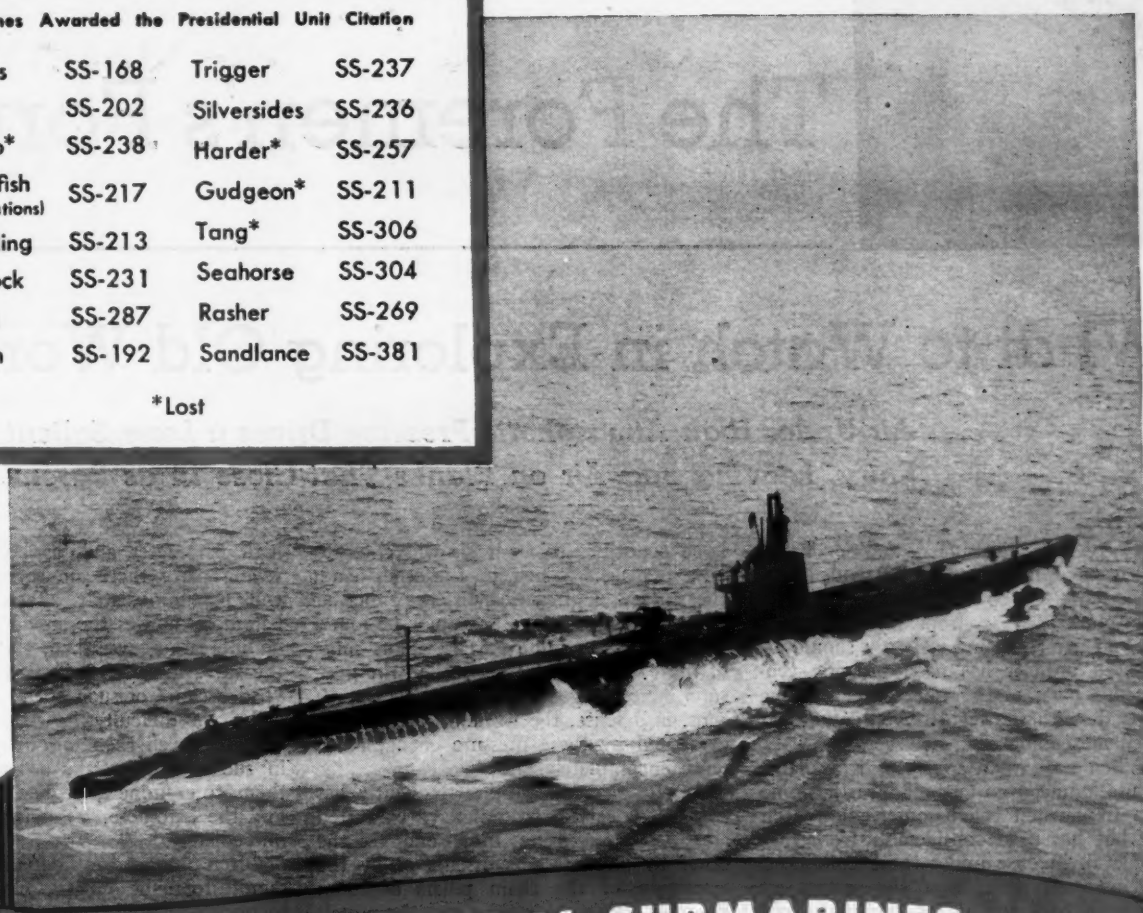
The warehouse has a roomy office partitioned off in one corner where business is transacted and records filed. The partition is tile and glass. A Cardex file lists all supply items by catalog numbers, or otherwise. A built-in bookcase stores catalogs.

Substantial tagged shelving provides storage for parts of small and moderate size, while floor space cares for heavy and bulky items. Like other wartime warehouses, this one has wooden shelving. There is one advantage—changes are easy.

Taken as a whole, these buildings are an important addition to the property. Maintenance will be nil, convenience and comfort will account for more and better work, material will be conserved and health improved. They are expected to pay for themselves through less time out for machines, higher coal output and better cooperation among the men.

Submarines Awarded the Presidential Unit Citation			
Nautilus	SS-168	Trigger	SS-237
Trout*	SS-202	Silversides	SS-236
Wahoo*	SS-238	Harder*	SS-257
Guardfish (two citations)	SS-217	Gudgeon*	SS-211
Greenling	SS-213	Tang*	SS-306
Haddock	SS-231	Seahorse	SS-304
Bowfin	SS-287	Rasher	SS-269
Sailfish	SS-192	Sandlance	SS-381

*Lost



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The Foremen's Forum

What to Watch in Exploring Old Works

Air Under High Atmospheric Pressure Drives a Long Salient up Main Entry, Leaving Bad Air on Flanks That Close In as Barometer Falls

SURVEYING abandoned, and so termed unventilated, mines is always attended with danger, for the composition of the mine atmosphere will vary from day to day. In fact, no part of a mine rightly should be surveyed until it has been properly ventilated. Parts of the mine often can be mapped without regular ventilation; at much inexcusable risk, however.

When no oxygen apparatus is available for use, one can go farthest into the mine at a time when the barometer has been low but has risen considerably from that low level, because under those conditions the increased pressure of the surface air will push back the air in the mines, and large quantities of fresh air will enter to take its place. When, on the other hand, the surface air pressure falls, the mine air expands, and irrespirable gas may be found escaping at the mine portal. Thus some of the bad air will leave. When the pressure increases good air enters the mine; thus, in a sense, the workings actually are ventilated by these pressure changes, but quite incompletely.

As the abandoned mine frequently has connected goafs (completely excavated areas communicating from one to the other by bleeders or crosscuts or by the extraction of the chain pillars of room headings) the air at a point near the portal, when it is under pressure, can pass into these goafs. There it may travel as much as perhaps one-thirtieth of the distance to the most remote point in the connected goafs, but as soon as the pressure falls again that air will come tumbling out into the heading. If a survey corps has gone on toward the face, this air, if not good, may block the return of the party and jeopardize the lives of its members. But as the air at times of low barometer usually is better near the portal than elsewhere, because of the frequent barometric changes, the air forced into the goafs at high barometer may not be very bad, and the surveying party for that reason may narrowly escape suffocation.

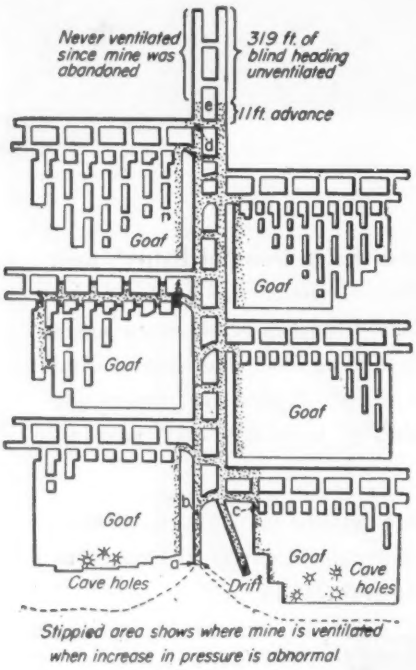


Fig. 1—Here is a mine that at periods of high barometer should be easy to enter without breathing apparatus as far as points where side entries leave the Main Entry, but a very dangerous mine if the barometer falls, for bad air pushed out of the Main Entry still fills the goafs on either side. Stippling shows area ventilated by high baric pressure.

With Unconnected Goafs

Where the goafs are not connected by the recovery of heading pillars or by bleeders between goafs and the next heading, the only way in which the air can fill the spaces left by the increased pressure of the outside air is by traveling along the headings to each specific goaf. In consequence, the outside air will go long distances into the main headings when the barometer is high and, under those circumstances, the surveying party also can travel long distances underground, so long as the party follows the course of the headings.

Too often the surveyor thinks that is a normal condition and that he can travel that same distance any day whatsoever, because he imagines that the air is being ventilated by through ventilation, but it is not. The favorable condition is due to high barometer and, as behind the surveying party there are several goafs that will be immediately affected by a low barometer and as the air drawn into those on inbreathing was bad, the road behind the surveying party will be filled with the "bad breath" of such goafs, and the party will have difficulty in getting back. It would be well then for surveyors engaged in such work to take a barometer with them, to examine it frequently, and if they find the barometer is falling to come out immediately.

Often progress can be made to the more remote room headings. One may be able to reach the mouth of even the most dis-

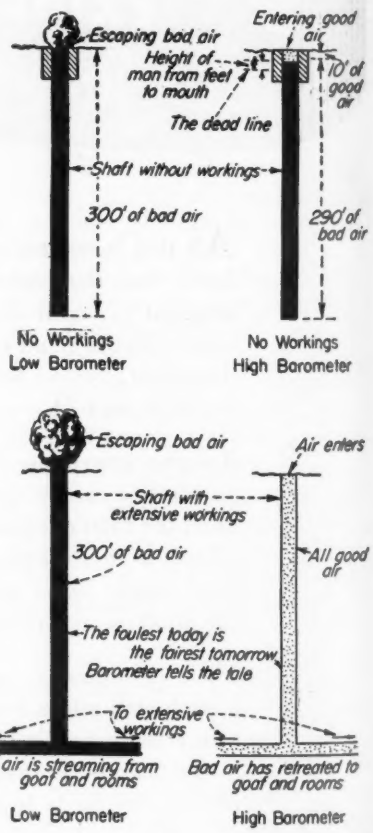
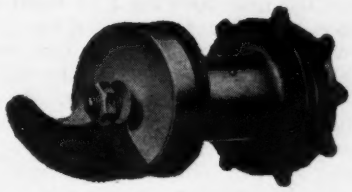


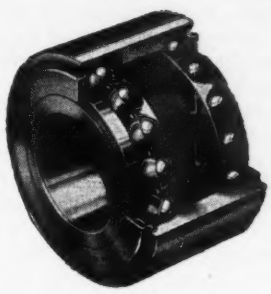
Fig. 2—With no workings, one can descend at best 15 ft.; with workings, one may explore the headings.

FAMOUS "FIRSTS" by NEW DEPARTURE



First Bicycle Coaster Brake

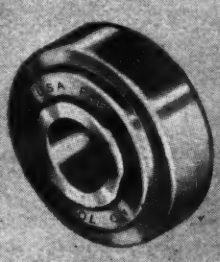
First Yellow Taxicab



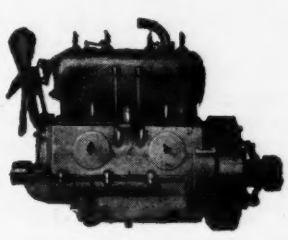
First Self-Sealed Lubricated-for-Life Mine Car Bearing

First Conveyor Roll Bearing

First Dual-Purpose Ball Bearing



First Self-Sealed Bearing Lubricated-for-Life



First Engine with Cylinders Cast en Bloc

First Successful Treadle Roll Bearing for Textile Looms

First Fan and Pump Shaft Bearing Self-Sealed and Lubricated-for-Life

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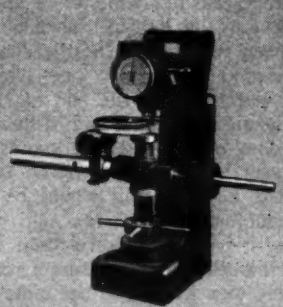

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tant room heading, because the travel of the air may be many times greater along the narrow approaches (headings) to large areas of contraction than it is within such contraction areas, but in a blind heading one can at best go no farther than a thirtieth of the length of the blind heading when there is a change of 1 in. in barometer and the normal pressure of the air at that point is 30 in.

Beware Blind Shafts

When there are no extensive bottom workings, shafts are the most dangerous places. Into a shaft that has no such development of any kind one may go a thirtieth of its depth with some security when the barometer is at its peak and perhaps a little farther, because when the barometer is low and the wind is blowing over the shaft mouth, some air is aspirated, or sucked, out of the shaft. If the shaft is 300 ft. deep, there will be 10 ft. of atmospheric air at the top of the shaft and little if any more. Beyond that point the new intake air cannot enter. Usually, those persons who go farther never return. What is below that point must be surmised. That will depend on the contamination of the air in the mine by loss of oxygen and presence of methane, carbon dioxide, hydrogen and hydrogen sulphide.

Suppose the old abandoned mine in the appended map has to be surveyed or merely inspected so that the quality of the coal can be determined, the thickness of the seam and of its impurities can be measured, the nature of its roof and floor can be ascertained, the area from which the coal has been extracted can be judged and the footage of development work still standing can be roughly gaged, all as completely as possible or rather as incompletely as conditions make necessary. This work we will suppose is to be performed by men without breathing apparatus, desirable as it would be to use such equipment for such purposes as it will serve.

In doing this work the barometer should be watched. When it goes down to the equivalent of 29 in. at sea level, the party should hold itself in readiness to enter the mine as the barometer rises and approaches the equivalent of 30 in. After the higher pressure is nearly reached, the party should enter the mine carrying electric lamps, an aneroid barometer and a safety lamp.

Forced Into Crop Headings

The party will have no difficulty in reaching the turnout to the First Heading Right because the air between a and *b* has been pushed into the mine and replenished continuously from the surface air several times over. Not all of it has gone into the goaf of the First Heading Right at c; some has gone to other headings also. Nevertheless that goaf has taken liberal parts of the continuous refilling of the air in the Main Heading. Much air also has come down through the air shaft. Moreover, some air doubtless has entered through caves in the roof, so that the inflow through the main portal and the shaft may not have made the First Right accessible beyond c to men unprotected by breathing apparatus, and in fact, even if there has been no cave or other roof leakage, most of the air entering the First Right will enter the goaf at c, though some will travel along the heading and enter at other inby room openings.

Much the same may be said of the First Left. Any air that may come through caves and crevices into the First Right or First Left will not change the quantity that will be pushed up the headings of the Main Entry. All the side entries beyond the First Right and First Left receive their air from the Main Entry and draw air in proportion to their own actual contractions, unless they have caves and crevices of their own. The air along the Main Headings probably will be breathable until, at *d*, the mouth of the Third Left is reached.

No Air Enters Development

The party can advance to e, which, if the change in barometer is 1 in., will be a thirtieth of the distance the Main Heading has been driven beyond d; in this case only 11 ft. farther, for this is a narrow blind end without wide workings leading from it. If you know the actual rise in barometer and that the heading is blind, you can calculate the length of the heading beyond d, if you make allowance for crosscuts. Development beyond side headings can be entered only a few paces—a rule worth remembering.

If at any time the barometer shows a lowered reading, it will be time to call the survey off and leave the mine. Though in entering no really bad air has been encountered, the bad air in the goafs has only a short way to go and the mine is full of such air; only the Main Headings are free of it. So suffocating air will begin to flow in all along the Main Entry and what was a passageway inviting travel will now be an avenue of death. It is a terrible risk to take, but many take it every year and tragedies result, as the records prove. Some of the best men in the industry have thus lost their lives. This happens because the condition of the ventilation is believed to be static.

If the necks of all the rooms and former rooms but the last in the side headings had been substantially bratticed as, say in the Second Left Entry (see illustration) or all but a few at the end of the heading, the air would have had to travel to the last room or the last few rooms, as the case may be. Then, it would be drawn into the headings and would be held in the remoter rooms of the side headings, making it possible to travel these headings to the mouths of their remotest rooms and enabling men to walk in the mine without fear of being suddenly cut off. But these room necks are, of course, not bratticed, so the air will move into the goaf at f and stand ready to return into the Main Heading at the first drop of pressure. The Second Left Entry as also all the side entries are likely to be unsurveyable.

The mine is thought either to be definitely untravelable or to be safe, but actually at one minute it is travelable and a few minutes later that condition has changed. The goaf air flows in through all the turnouts from the Main Entry, and from every side heading comes suffocating gas which may or may not be explosive.

But it will be asked, "Why does the air in the Main Heading and in the turnouts of the side entries and from the exterior of the mine, having arrived at the outby edge of the goaf, turn off into that working instead of going straight on toward the end of the side entry, delivering, of course, a part of that air at every succeeding room neck?" Let us suppose that the side heading is of the same length as the several rooms out of that heading and the distance between room centers six times the width of the side heading. For instance, the width of the side heading might be 8 ft. and the rooms 48 ft. between centers.

If the air at A in Fig. 3 is being forced toward the end of the heading by x lb. per square inch due to the shrinkage of the air at the end of the heading, the air will be forced toward the end of the goaf by a pressure of 6x lb. per square inch, because the shrinkage in that direction will be six times as great. That being so, the direction of air travel will be *AB*, which is the diagonal of the rectangle *ACBD*, and the cotangent of y will equal 6, and y will equal 9 deg. 28 min.

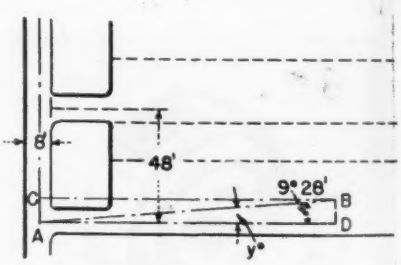


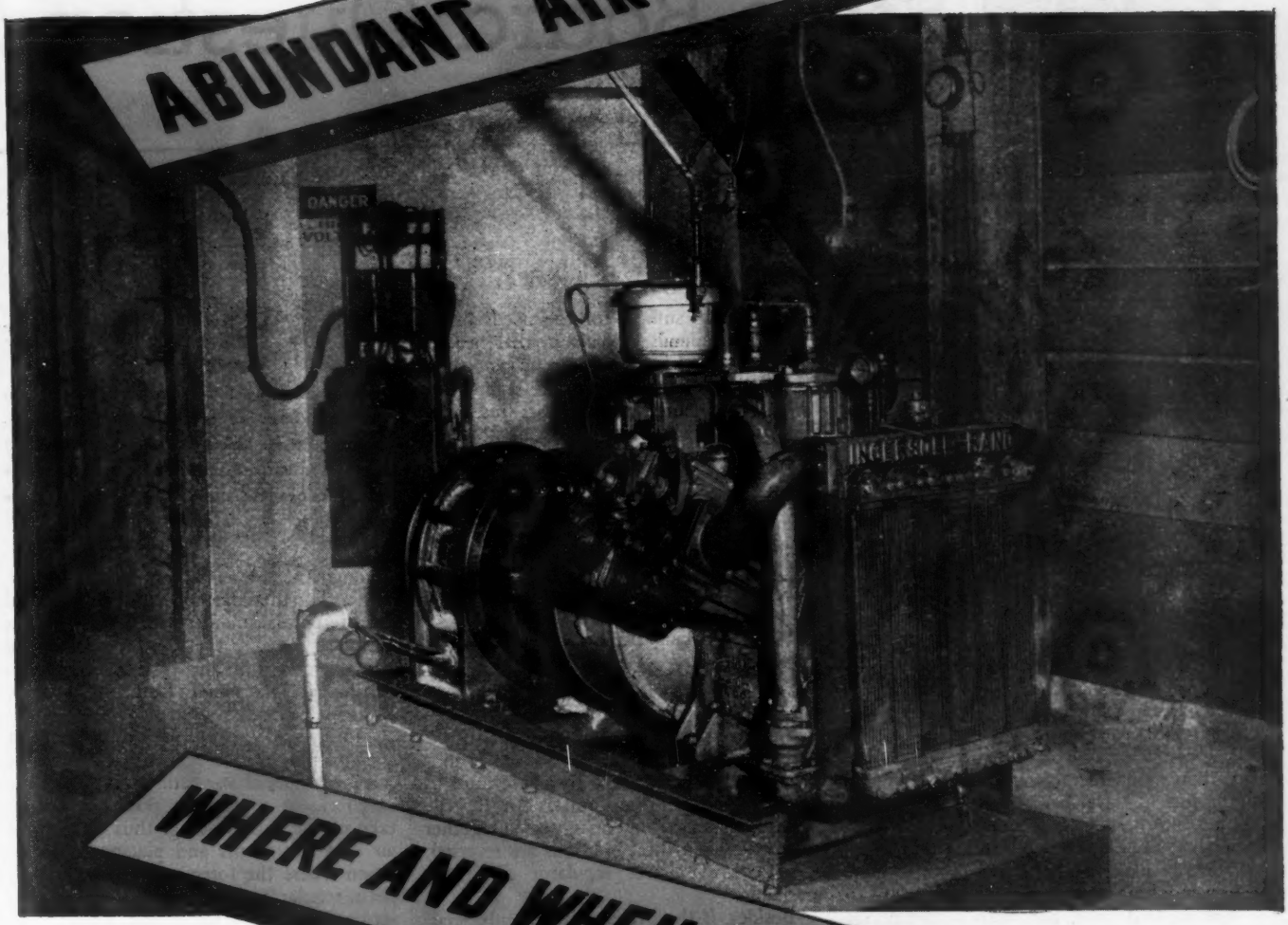
Fig. 3—Shows why air goes into goaf rather than along heading. The drag is six times as great in that direction.

With a longer or wider side heading, a shorter room length or a shorter distance between room centers, the tendency of the air to travel to the goaf will be somewhat decreased, but in any event there will be a marked tendency for the air to enter the goaf despite that area's rock-cluttered condition.

However, in the crop headings the mud from the surface and the marked subsidence will have filled many interstices, and consequently the areas where there will be air to contract under pressure and where air can travel through the goaf will be decreased, and hence what air enters the side headings near the crop will be, on the one hand, less in volume, but, on the other hand, more disposed to follow the heading and eschew the goaf.

Old mines should not be surveyed without a proper reestablishment of ventilation or the use of oxygen-breathing apparatus. To find that the air has improved is not a sign that natural, or improvised fan or furnace, ventilation has been established; the change may be due wholly to a change in the barometric pressure.

ABUNDANT AIR POWER



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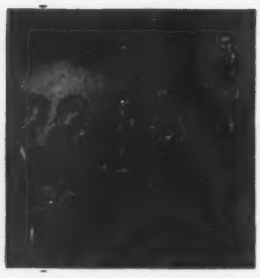


State-Board Questions

Fireboss, Indiana

Q.—How do overcasts aid ventilation?

A.—They aid (1) by eliminating doors. When ventilating without overcasts the air in the side heading is shut off every time a trip or a workman goes through the door. The loss of a little air under and around the door is not necessarily important because the side heading probably does not need the air and what is not diverted goes to entries beyond it, but, when the door is wide open, the side heading will get almost no air at all.

(2) By shortening the air travel of some of the air. Less air has to be forced up to the remote parts of the mine. When doors are used to distribute the air by a "sightseeing trip" to heading after heading, the current gathers up depleted air, also carbon dioxide, methane, dust, smoke and gases from explosives and, in case of a fire, carbon monoxide also and the last men in the line of travel have to try to subsist on an "air hash" that robs them of all vitality. On the other hand, with ventilation by splits and overcasts, in no split is any more air provided than is necessary to operate that split, but, with a continuous current, all the air goes to every heading, and the quantity of air is not graduated to need. All get the same volume of air but not air of the same quality. The men at the end of the "long, long trail awinding" may be forced to suspend work if shots fill the air with smoke, and even at other times their lights will go out.

Q.—What are the main requirements of an overcast?

A.—(1) An overcast should be so built as not to reduce the width and height of the main heading at the place of erection, because any such reduction would increase the resistance of the main air current.

(2) An overcast also should be so designed that the space provided for the passage of the air over the heading to be crossed has smooth lines and be so high and wide that it will not reduce unduly the cross-section of the airway over the heading it crosses; but further comment on that proviso should be made.

Why Make Overcast High?

While the cross-section of the main heading is rarely reduced by the erection of an overcast, except perhaps overhead, that of the airway of the side heading more often is, but most persons will assert that if the quantity of air needed in the side heading suffices for the needs of the men and animals working in that heading and serves to keep the methane percentage down to a really safe margin at the time when that heading makes its maximum demand for air and has its greatest extension, the reduction of the cross-section at the overcast will not cause a loss of air power; this because if any more air than suffices were carried into the side entry a regulator would have to be provided to reduce that quantity to actual needs. The overcast, these persons will assert, might just as well exercise that function by partially blocking the air.

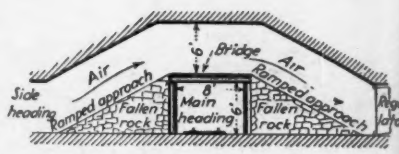
Overcast a Bad Regulator

But the overcast is not an ideal regulator, for it is not itself regulable. It may pass too much air when men and animals are few, methane emission is low or the heading is short, and may pass altogether too little when the conditions are reversed, so, to save air, a regulator always is desirable.

Besides, if the overcast is the only regulator, the air on the bridge of the overcast will be at almost the same low atmospheric pressure as the return into which the air will discharge. Note that the air going under the overcast will be near the full fan pressure, so as the result of this large pressure difference, the leakage will be considerable. But if the regulator is placed between the overcast and the return, it will not let the pressure in the bridge of the overcast fall to the pressure of the main return, and the leakage of air consequently will be reduced.

All overcasts leak. They are not nearly as easy to make airtight as the brattice in a crosscut. This is the principal difficulty, but where a brattice measures, in a 6-ft. seam, 6x perhaps 8 ft., or 48 sq.ft., an overcast may have an exposure on two sides aggregating 96 sq.ft. and at the top on the underside of the bridge $8 \times 8 = 64$ sq.ft., or in all 160 sq.ft., or 3.33 times as great an area as with the brattice. Besides this, there is leakage where the overcast is connected with the roof. Further air losses result from the abuse of the overcast, by derailed trips and horseplay.

It is well, therefore, to have the pressure of air over the bridge of the overcast as near as possible that of the pressure under the bridge of the overcast consistent with the obtaining of the requisite pressure for passing the required quantity of air



Overcasts provide much opportunity for leakage, because of their method of construction, their large areas of exposure and their location at points where the water gage is greater than at any point in the side entry.

through the side entry. It must be remembered that the edges of the rock excavated for the emplacement of the overcast are as a rule so irregular that the air resistance of the overcast will always be greater than can be expected merely from the reduction in cross-section.

However, some will rightly argue that they would like to regulate the pressure, not by a special regulator but by the use of checks at appropriate points in the intake of the side heading, thus driving the air into the rooms and placing the regulation where the foremen can handle it in their regular visits. A trip to the main return to regulate the airway would, they will declare, be an insufferable nuisance and therefore rarely made. One trip probably would not suffice, as the adjustment is a matter of trial and error. Such a remote location, however much it may prevent leakage of the overcast and however much it may free the regulator from manipulation by miners and others, will not compensate for its inherent defects—distance and lack of approachability. In surrebuttal it may be said that checks along a haulage road in a degree are dangerous, also a nuisance and less effective than one on the return. They are subject to damage and may be torn down. A check, moreover, has a function other than regulating the split, and the two functions—split regulation and room ventilation—may conflict.

(3) The overcast must be made tight against the leakage of air to the return. If built of wood it should comprise double walls of tongued-and-grooved boards driven tightly together and well nailed, and from the bridge up should be fitted carefully to the rock surfaces. Too many persons use overcasts as drums and men clamber over them to inspect the return heading of the side entry for roof falls, and this results in leakage. If the air leaked into the main intake, no great exception could be taken, for it could be, and would be, used in other side headings, but leakage entering

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the main return by way of the overcast is lost forever. In discussing Requirement No. 2, this requirement also was described.

(4) The overcast should provide sufficient space for haulage and the passage of men in safety past trips of cars.

In short, overcasts should afford: (a) ample space for air and travel along the main road; (b) ample space for air passing from the side headings to the main return, and (c) ample strength so that they will not leak air. It is near the surface that most air has to be handled and speeds are highest. This air, having been carried through the bottle neck, should not be wasted by leakage or by excess use.

In most cases, more air is traveling than it is profitable to carry through the restricted cross-section outby this point, so beware of wasting any of it. It would be far better to run the fan slower than to provide so much air and throw it away at an overcast, and if care is not taken the air will leak at that point, for the water gage is greatest in the airways near the fan. Yet it is the first overcasts and the first brattices that are most neglected. Near the working face, the water gage is at a minimum and less waste will occur.

State Mine Inspectors, Illinois

Q—Name and describe the gases commonly found in coal mines. How dangerous are they to life and what are their effects on man? Give also their symbols, specific gravities and properties. In what parts of the mine are they found? How are they produced? Describe their effects on combustion (continued).

The more usual gases were described in the May issue, pp. 118, 120. Others are hydrogen, acetylene, nitrogen compounds, sulphur dioxide, aldehydes and ketones.

Hydrogen

Hydrogen is odorless, colorless and tasteless. This gas, says I.C. 6983, "is formed in mines in much the same way as carbon monoxide—by incomplete combustion of methane or coal during mine explosions and mine fires and in the firing of explosives for blasting. It may also be formed when water comes in contact with incandescent coal or rock strata, as in extinguishing mine fires. Hydrogen occasionally has been found mixed with methane coming through the strata into mine workings."

There are other sources of this gas: (1) the charging of batteries in the mines, (2) the distillation of coal in the absence of air and (3) the action of acid mine water on iron or steel in pumps and pipes. In pumps, in upward bends of pipes and in the summits of siphons, the hydrogen gathers and cannot escape until water sweeps through the pipes and clears them out, and not always even then is this gas entirely displaced. In the opening of split centrifugal pumps and in the priming of siphons at the high point of the pipe, the hydrogen may ignite, if flames are not kept away. The flame of burning hydrogen is so hot that it will pass through the wire gauze of an ordinary safety lamp, which therefore furnishes no protection.

The specific gravity of hydrogen is 0.06959, about an eighth that of methane and about a fourteenth that of air. It has an explosive range of 4.1 to 74 percent, meaning that it will not explode if there is less than 4.1 percent or if there is more than 74 percent of hydrogen present. It therefore is quicker on the trigger than methane and cannot be as easily stifled when in an excessive percentage. You can't explode a gas without some oxygen, but hydrogen and acetylene make you wonder if there is any limit to the possibilities in that direction. The symbol of hydrogen is *H*. It is not a poisonous gas.

Acetylene

Acetylene is another colorless and tasteless gas, but it has an etheral odor which some have compared to geranium. It also is slightly poisonous. It has been said to be a minor natural constituent of mine gas. Where carbide lamps are used, if an open canister filled with calcium carbide falls into water or if partly spent carbide is dumped where water is present, acetylene (C_2H_2) is formed, with a specific gravity of 0.9107. Acetylene explodes in air with concentrations of that gas between 2.3 and 80 percent, making it the most explosive of all mine gases.

Nitrogen Compounds

Imperfect detonation and slow burning of nitrogen-containing explosives, such as nitroglycerin and ammonium-nitrate dynamite, will cause oxides of nitrogen to be formed. Of these, there are seven—nitrous oxide or "laughing gas" (N_2O), nitric oxide (NO), nitrogen trioxide (N_2O_3), two nitrogen peroxides (NO_2 and N_2O_4), nitrogen pentoxide (N_2O_5) and an unstable pernitric oxide. Apparently, nitric oxide (NO), a colorless gas, is first formed, but, after a short period of contact with the air, more oxygen combines with the nitrogen and two nitrogen peroxides are produced. NO_2 is a reddish brown gas and N_2O_4 (a gas of the same ultimate analysis but with a different hook-up of atoms) is a colorless solid. At 70.3 F., the reddish-brown gas begins to condense as a yellow liquid, but, like steam, much of it remains in the air as a vapor. Nitrous fumes can be easily detected by their smell.

All these nitrous gases, except the "laughing gas" of the dentist, are poisonous, and all of them except nitrous oxide may be formed by imperfect detonation and slow burning of explosives. They cause watery liquid to form and pass into the tissues of the lungs, thus causing a swelling of those organs (edema). Particularly dangerous are they, because the effects may be delayed 24 or even 48 hours. Men will work in such an atmosphere, believing it only annoying to eyes, nose and throat, and something a husky man would scorn to fuss about. It is, however, likely to cause an intensely acute bronchitis, so severe as to be fatal. Nitrogen peroxide is not explosive.

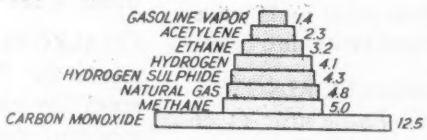


Fig. 2—Lowest percentages at which six mine and two other gases presented will explode in air. Shows how much gas is needed to create an explosion.

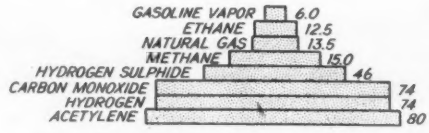


Fig. 3—Highest percentage at which the same mine and other gases will explode in air. Shows how much gas will have to be present to stifle an explosion.

Sulphur Dioxide

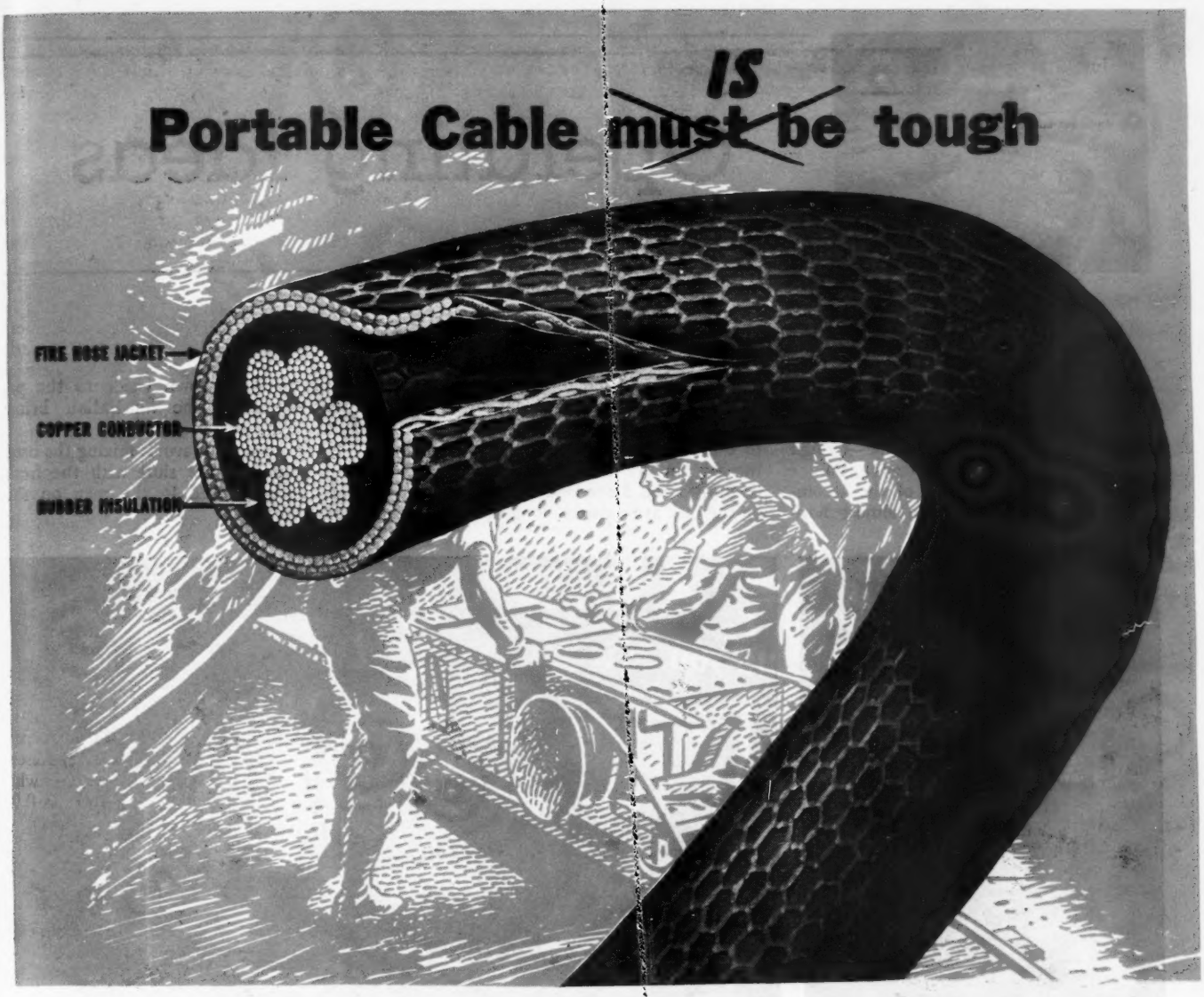
Sulphur dioxide (SO_2), a very heavy colorless gas with a specific gravity of 2.2638, an irritating smell and a pronounced taste, is formed by the combustion of pyrite. Fortunately, it is one of the most soluble of gases—2,105 times as soluble as air. Its odor and the irritation it creates are clear indications of its presence long before it becomes dangerous, which is well. As little sulphur dioxide as 0.001 percent will produce slight irritations of the mucous membrane and respiratory organs. This condition becomes pronounced when the percentage rises to 0.003. Seeing that in rabbits as little as 0.04 percent will congest the chest and inflame the air passages and eyes of those animals, while 0.1 percent will cause their death in a few seconds, it is fortunate that sulphur dioxide dissolves so readily in water and thus is removed from the air. It forms sulphuric acid when it so dissolves, and this may be the form in which it acts on the mucous membranes.

Aldehydes and Ketones

One of the dangers with internal combustion engines such as have been used sometimes in the mines for haulage, pumping and even ventilation is that the oil vapors are not completely burned; some of the many aldehydes and ketones may be formed, to say nothing of carbon monoxide. For all we know, these aldehydes may be generated in large quantity in mine fires and explosions. Aldehydes and ketones are extremely soluble and quite mildly poisonous in such concentrations as are customary in industry, but in a mine fire or explosion the quantities may be much larger. When freely circulated in a mine, the exhaust from a gasoline pump was found highly laxative.

Other gases doubtless are present, among them other hydrocarbons than methane of the paraffin series, ethylenes including olefiant gas, diolefines, naphthenes, benzene hydrocarbons, etc., many of them solids at ordinary mine temperatures. Nor should the occurrence of steam after an explosion be forgotten or its presence all the time as water vapor.

Portable Cable ~~must~~ IS be tough



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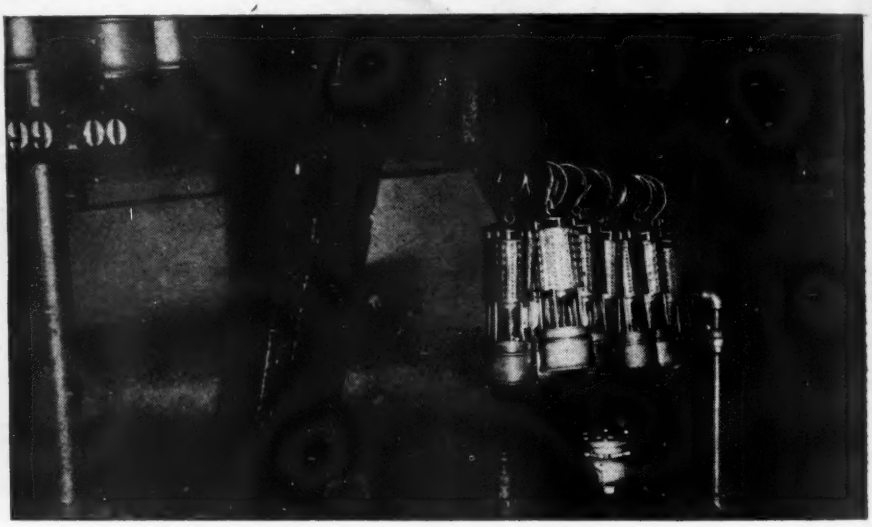
Operating Ideas

Safety Lamp Mix-Ups Avoided

A PIPE RACK for collecting safety lamps as they are returned at the end of the shift relieves the congestion at the lamphouse at Westmoreland colliery, The Lehigh Valley Coal Co., West Wyoming, Pa.

The rack, shown in one of the accompanying illustrations, has an almost horizontal section underneath the counter where the lamps are given out and a sloping section which passes through the wall to the outside of the building. Each man turning in a safety lamp simply extinguishes the flame and hooks the lamp on the rack as he passes along the building. The lamp slides down inside to the position shown in the illustration below at the right.

This arrangement avoids mixing the used lamps from the first shift with the fresh lamps being handed to the men on the second shift.



The safety lamp being returned is hooked on the rack by miner outside the lamphouse. Right: Safety lamps come to rest without damage underneath the counter in the lamphouse.

Motorized Brush Cleans Safety Lamps

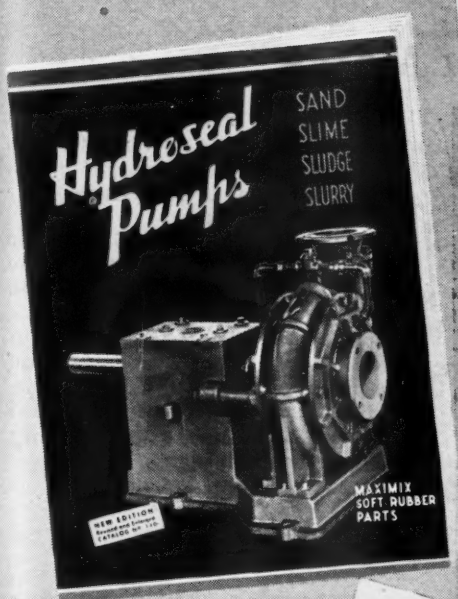
A motor-driven brush facilitates cleaning safety lamps at the lamphouse at the Westmoreland mine of The Lehigh Valley Coal Co., West Wyoming, Pa.

In the servicing of some 300 safety lamps a motor-driven brush, shown in the accompanying illustration, is used for cleaning the gauzes and the glass of each lamp. This brush cleans the parts more thoroughly and much faster than the hand-brush method.

A wire gauze from a safety lamp being cleaned by the motor-driven brush.

Pump Your Rock Refuse Any Distance

Today it is not necessary to dump your rock refuse near your tipple or breaker, because it is too costly to transport it any distance away. The Hydroseal Pump is specially designed for handling abrasive rock, sludge and sand. The rock refuse photographed was picked up at the end of a Hydroseal Discharge Line, after being pumped several hundred feet. Pipelines can be a mile or more long, they can cross creeks or ravines without expensive trestles. . . . As compared with trucking or hauling by narrow gauge railroad, installation and operating costs by pumping are extremely low. Weather does not bother pumping and if water is scarce, it can be recirculated. Send for Catalog No. 140, or write us about your refuse disposal problem, so we can answer with definite suggestions.



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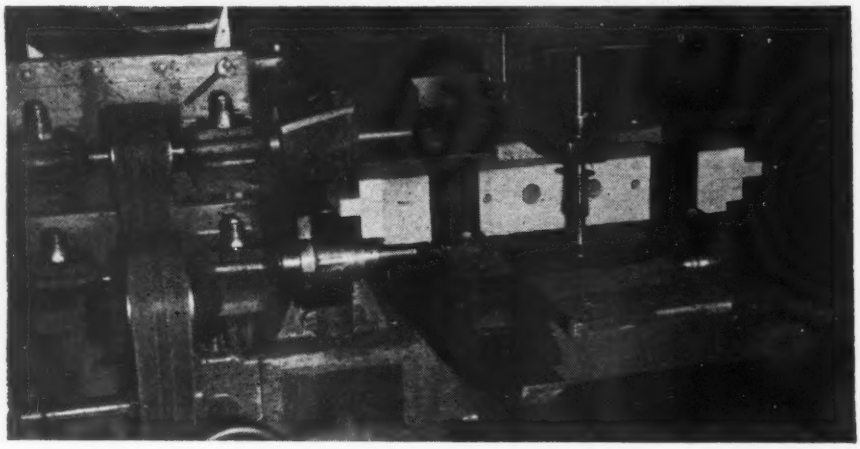
WRITE FOR THIS CATALOG

Tenon Machine Makes Better Car Braces

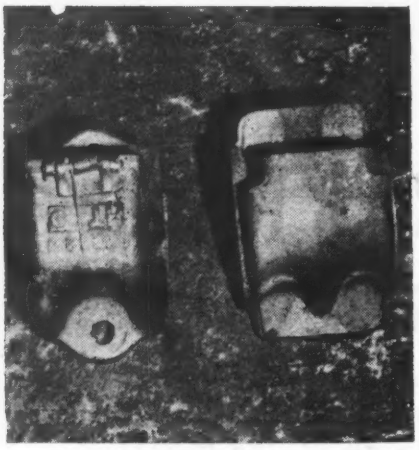


A TENON MACHINE still plays an important role in the car shop, says Alfred J. Radley, foreman of wood shop, Jeddo-Highland Coal Co., Jeddo, Pa.

The Fay & Egan tenon machine shown in the accompanying illustration shapes wooden braces for three styles of pit cars. Cross braces shaped on the tenon machine and stills shaped by the mortise and boring machine are largely responsible for the high degree of rigidity found in the finished pit car.

Tenon machine has completed the final operation in the shaping of the cross brace for the pit car.

Motor Axle Bearing Cap Redesigned

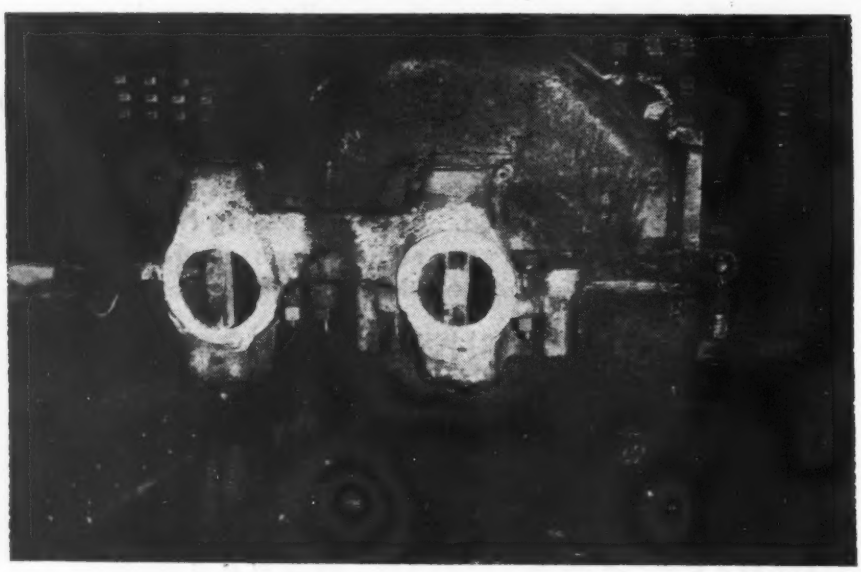


A FOUR-SCREW-STYLE axle bearing cap replaces an older style bearing cap in the locomotive-motor revamping program at the Drifton shop of The Lehigh Valley Coal Co., Drifton, Pa.

The completely new axle bearing cap, designed by the engineering department and shown in the accompanying illustration, is one of the changes included in the motor rehabilitation program to eliminate weaknesses discovered through operating experience. The new cap is held in place by four capscrews instead of the two or three used in the old styles. Besides possessing the added fastening advantage the cap uses a longer axle brass, a commendable feature, which helps to prolong the service life of the gear and pinion.

How the new style bearing cap (right) compares in size with the old style which it has replaced

Metal Inserts Hold Center Marks



METAL INSERTS PRESSED onto wooden blocks hold centers established for final machining operations on magnet frames at the Drifton shop of The Lehigh Valley Coal Co., Drifton, Pa.

The inserts, visible on the blocks in the accompanying illustration, are cut from light-gage tin containers and pressed onto the blocks. Afterward, the blocks are clamped in place as the magnet frame is bolted together. The center marks, when once placed on the metal inserts to establish the working centers of the gear and pinion, are available for reference during the machining operations.

How the metal inserts appear after being clamped in place in the magnet frame.

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LONGER LIFE with no increase in weight

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MINIMUM WEIGHT with no decrease in life

IF you want cars to last, you must build them as *strong* as possible. With COR-TEN construction you don't have to increase the weight of your cars to make them stronger and longer lasting.

U·S·S COR-TEN's yield point of 50,000 lbs. per sq. in. is 1½ times that of plain steel. Thus when used in the *same thicknesses* (same weight) as plain steel, COR-TEN will greatly increase resistance to the hard knocks and rough treatment inseparable with mine car service.

Because COR-TEN has greater resistance to abrasion, it stands up better under the continuous wear of coal and rock handling.

COR-TEN's greater resistance to shock, impact and fatigue also insures added ruggedness that helps absorb abuse.

And finally, COR-TEN's unusually high resistance to atmospheric corrosion—4 to 6 times that of plain steel—is an outstanding factor in making cars last longer, especially under wet conditions with sulfur coal.

• • •

These are facts, demonstrated daily by more than 12,000 COR-TEN mine cars now in service under all sorts of conditions.

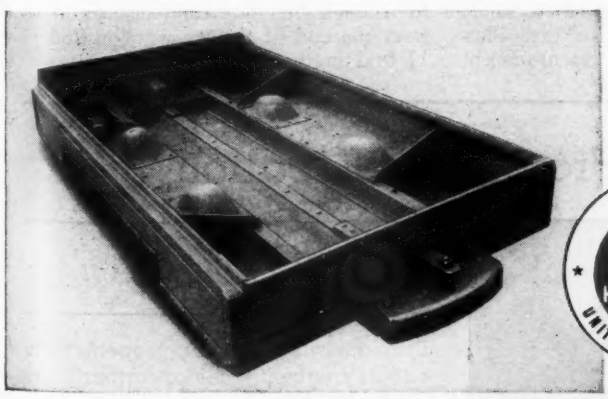
U·S·S COR-TEN can be used to *save weight*, too. If you are satisfied with the life and capacity of your present equipment but want to reduce weight to a minimum, COR-TEN can be used in *reduced* thicknesses to give you lightweight construction, that, because of COR-TEN's superior physical properties, will be just as strong—and last just as long—as the heavy plain steel construction it replaces.

Lightweight design and lighter COR-TEN construction, by lifting dead weight off the car, lighten the load on mine trackage, wheels and power lines every time the cars are moved. This saving of weight means that one or more *additional* cars can be hauled per trip without increasing present motor capacity—will add materially to the tonnage that can be hauled per year. These advantages of light weight are especially important in mines with heavy grades and with limited motor capacity, will more than compensate for the difference in life between 3/16" and ¼" COR-TEN construction.

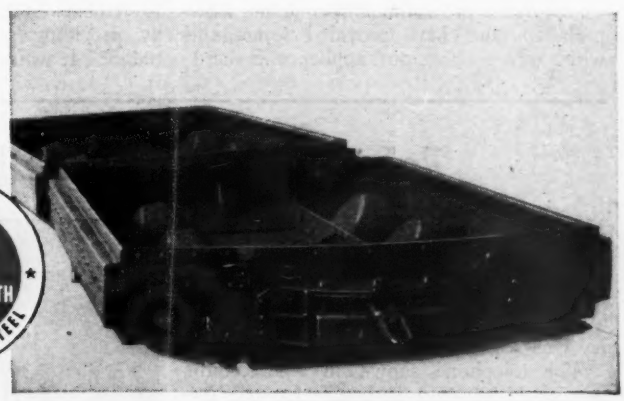
• • •

If you would like to know how COR-TEN cars—built strong to add life or built light to reduce weight—are performing in service similar to your own, write us.

In 220 cars like this, U·S·S COR-TEN **was used in same thickness as plain steel to insure maximum strength and maximum service life with minimum weight.**



U·S·S Cor-Ten used in thinner sections, saves 600 lbs. in each of 1,025 cars like this. A total saving of 308 tons—equivalent to the weight of 162 empty cars.



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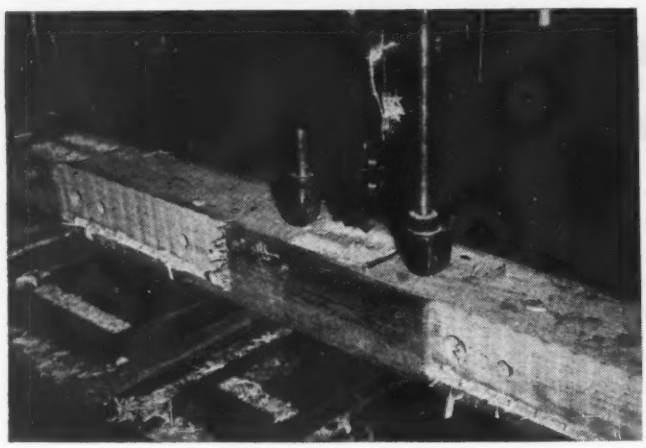
UNITED STATES STEEL

Machine Speeds Output of Car Sills

A COMBINATION MORTISE and boring machine has increased the output of wooden car sills as much as four-fold, reports Alfred J. Radley, foreman of the wood shop, Jeddo-Highland Coal Co., Jeddo, Pa.

The Greenlee mortise and boring machine turns out 24 car sills in a shaft with one operator where only six were possible with another machine. The sill in the machine is 6 x 8 in. x 13 ft. long and requires five mortise seats and 26 holes ranging from ¾ to 1⅞ in.



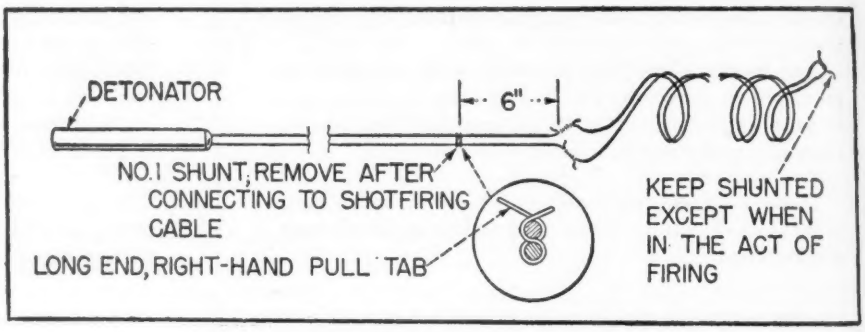
Mortising tool about to be lowered into the wooden sill.

Any one of four drills ready for operator's use.

Safer Detonator Circuit Suggested

SHIFTING THE POSITION of the shunt on the leg wires of a detonator to afford the shotfirer better protection while he is connecting up a shot is suggested by John W. Harris, deputy State mine inspector, Bridgeport, Ohio.

"The shotfirer is censured," says Mr. Harris, "if his shotfiring cable is not kept shunted while connecting up a shot. Yet we ask this same shotfirer to pull off the shunt on a detonator to hook up and thus expose himself to the hazard of an unshunted blasting circuit because we have not provided enough free wire behind the shunt to hook up the shotfiring cable before he removes the shunt. Neither have we provided a workmanlike shunt with pull tabs but have provided something which on a dangerous appliance is hard to remove. Can we not promote safety by providing something like that illustrated? It would entail no expense except to redesign the shunt and place it 6 in. from the end of the leg wires instead of 1¾ to 2 in., as is the custom."

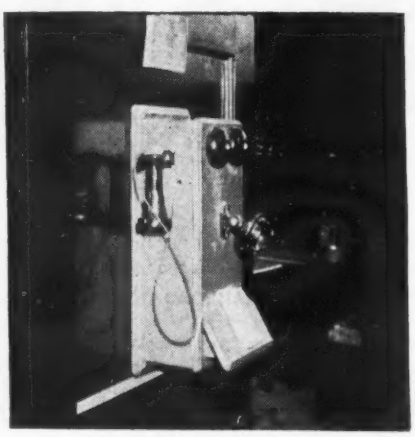

DETONATOR
6"
NO.1 SHUNT; REMOVE AFTER CONNECTING TO SHOTFIRING CABLE
LONG END, RIGHT-HAND PULL TAB
KEEP SHUNTED EXCEPT WHEN IN THE ACT OF FIRING

How change would affect detonator leg wires.

Telephone Serves Shop From New Location

MOUNTING THE TELEPHONE on the door of shop partition puts it in the most accessible position for employees of the surface shop, says Ralph Frost, electrician, Westmoreland colliery, The Lehigh Valley Coal Co., West Wyoming, Pa.

The telephone shown in the accompanying illustration is handy for use by the storeroom clerk and also the mechanics working in the shop. This location is good because when the storeroom is locked the telephone can still be used by the men in the shop or nearby buildings.



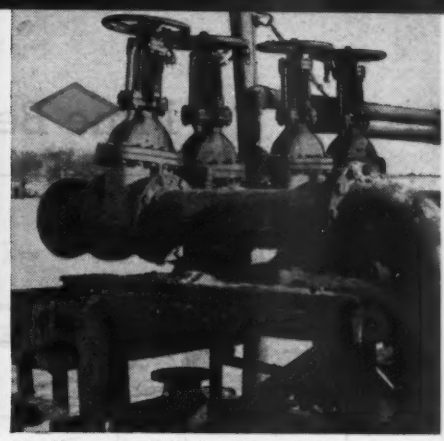
Telephone mounted on door serves communication needs of storeroom and shop.

It Happens

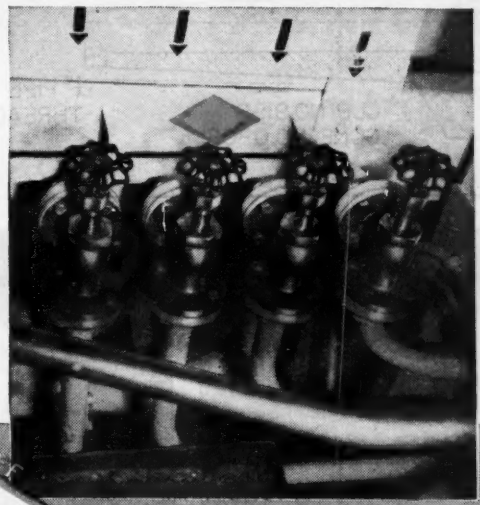
During visits to mining properties the editors frequently see operating ideas they consider unusual. When one is pointed out, the reply often is: "That's not new; we've been using it a long time." That is the point—an old idea at one mine can become a new idea at another. So we urge you to send in your operating or safety ideas. For each acceptable idea Coal Age will pay $5 or more on publication.

America's Fighting Men find "DIAMONDS" along the vital "fluid highway" of their mammoth war machine...

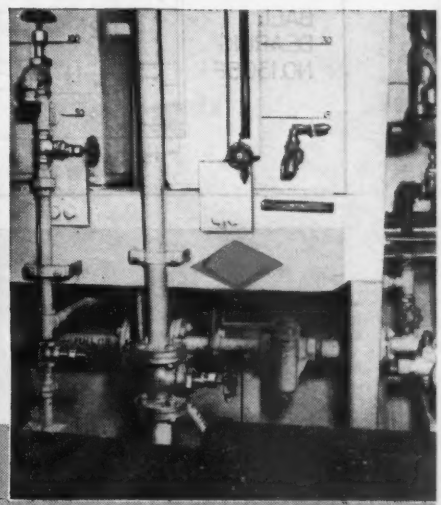
On a storage tank in the South Pacific.



At oil terminal docks throughout the world



In the engine room of an LCI.



On the piping system of a cargo carrier.

American land, sea, and sky forces find the famous Jenkins Diamond trade mark wherever they serve, afloat or ashore, on hundreds of thousands of Jenkins Valves that control the "fluid highways" so essential to the steady march toward victory.

To these men, faced with stupendous tasks of moving rivers of "fighting fluids" and with operating equipment under the worst conditions imaginable, the Jenkins Diamond means dependable valve performance – a quality far more precious to them than bushels of real diamonds.

Wherever the American flag flies throughout the world, new millions of men are learning what valve-wise piping specialists have known for more than 80 years . . . that the Jenkins Diamond is the mark of *trustworthy* valves. It will remain our pledge of superlative quality, as long as Jenkins Valves are made.

Jenkins Bros., 80 White Street, New York 13; Bridgeport, Conn.; Atlanta, Boston, Philadelphia, Chicago, San Francisco. Jenkins Bros., Ltd., Montreal, London.

Look for the famous JENKINS DIAMOND-SIGNATURE TRADE MARK, and be sure of *Trustworthy Valves*

Jenkins has earned repeated Army-Navy and Maritime Flag awards by increasing production tremendously to meet endless war needs . . . but no slightest sacrifice has been made of Jenkins standards in materials, design, or workmanship.

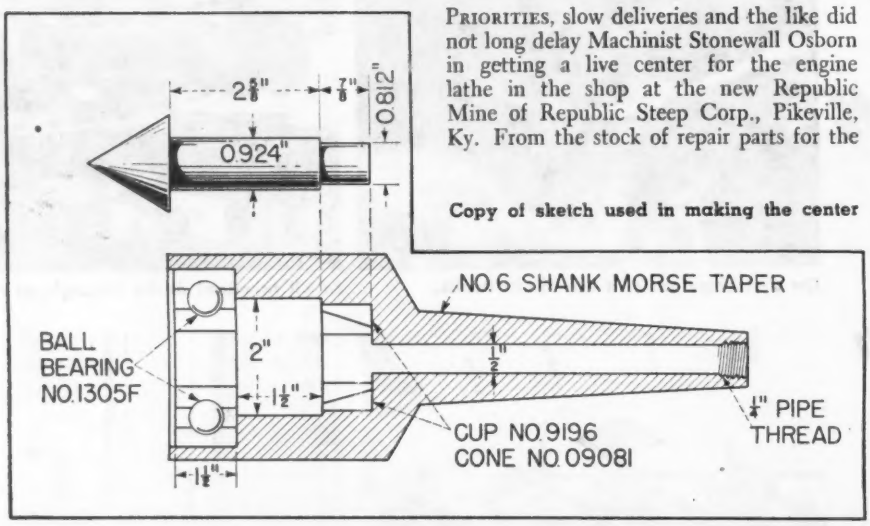
JENKINS VALVES

SINCE 1864

For every Industrial, Engineering, Marine and Commercial Service . . . In Bronze, Iron, Cast Steel and Corrosion-resisting Alloys . . . 125 to 600 lbs. pressure

Sold Through Reliable Industrial Distributors Everywhere

Mine Bearings Make Live Center for Lathe

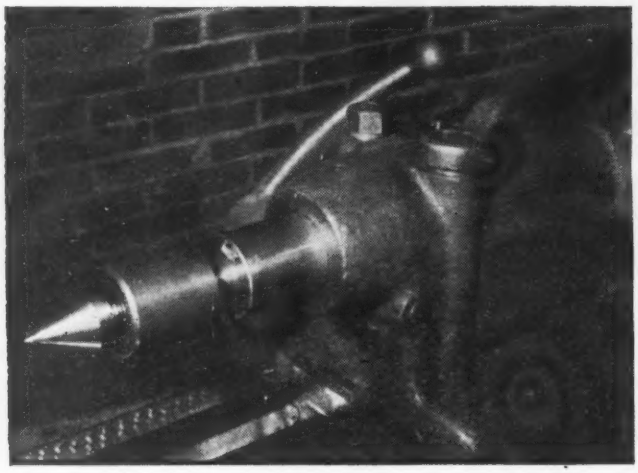


Copy of sketch used in making the center

PRIORITIES, slow deliveries and the like did not long delay Machinist Stonewall Osborn in getting a live center for the engine lathe in the shop at the new Republic Mine of Republic Steep Corp., Pikeville, Ky. From the stock of repair parts for the underground machinery he picked out a couple of anti-friction bearings and proceeded to make his own.

The front bearing is a No. 1305F ball bearing from the traction-motor armature of a Joy shuttle car. The rear bearing, taking the thrust, is a Timken (Cup No. 9196, Cone No. 09081) from the idlers of the Joy belt conveyors used as the primary transportation for coal and rock out of the mine.

The lathe center proper can be removed from the bearings by a few taps with a rod inserted from the back end of the No. 6 Morse taper. The end of the hole is threaded for a ¼-in. pipe fitting so that grease can be forced occasionally into the bearings. The new lathe on which the live center is used is a 22-in. unit with 10-ft. bed made by the Springfield company.



Left: Live center in place in tailstock. Right: Machinist Stonewall Osborn shows how the center proper can be removed by poking a rod in through the back end.

Inclined Horses Replace Jacks

INCLINED HORSES are used in place of ratchet jacks for handling reels of hoisting rope at slopes, says Alfred J. Radley, foreman of wood shop, Jeddo-Highland Coal Co., Jeddo, Pa.

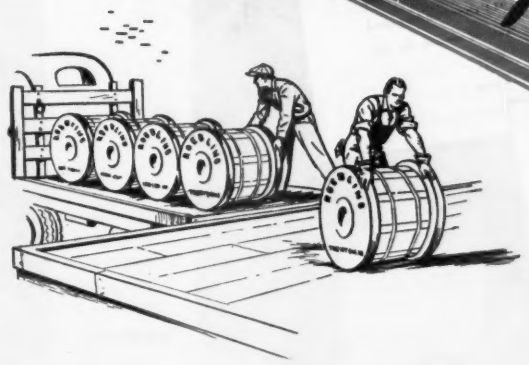
Wooden horses, shown in the accompanying illustration, are built so that a reel of hoisting rope, with a pipe or shaft through it, can be rolled up and stationed in notches. Rolling the reel in this working position is considered to be much safer than using jacks. The small horse is to hold the cable while the shackle is being attached.

A new set of horses for handling hoisting rope is ready to leave the wood shop.

ROEBLING

Delivering the goods-

THAT "DELIVER" FOR YOU



PRODUCING THE FINEST in electrical wires and cables—over 60 types for every purpose—is Roebling's job. From bare copper wire and strand to tough power cables . . . they're all made to the same high standards . . . to give superior performance.

And it's your Roebling electrical wholesaler who makes them available to you . . . even under today's trying conditions. You can count on him . . . to provide a wide variety of Roebling and other quality products . . . for delivery when and where wanted . . . at a fair price.

Look to Roebling electrical wires and cables . . . and to Roebling electrical wholesalers . . . to fill your needs. Together they're at your service—for your profit!

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

AT YOUR SERVICE—ROEBLING ELECTRICAL WHOLESALERS

Typical of the electrical wholesalers who offer Roebling products are these two: W. C. Figroid, (top) Gilson Supply Co., Oakland, Calif., and E. D. Knight, Virginian Electric, Inc., Charleston, W. Va.

FOR YOUR PROFIT!—ROEBLING ELECTRICAL WIRES AND CABLES

Weatherproof Wire · Rubber Covered Wires and Cables · Service Entrance Cables (including Thin-Wall Roeplastic Insulated Building Wires) · Rubber Sheathed Portable Cables · Rubber Insulated Power Cables · Telephone Wires · Varnished Cambric Power Cables · Magnet Wire · Bare Copper Strand Pigtail and Braided Copper · Trolley Contact Wire

PACEMAKER IN WIRE PRODUCTS

Victory Production
AWARD
COAL AGE Presents to the Officials and Employees of:
This certificate in honor of their outstanding contribution to the national war effort in the form of increased coal production in 1944 above and beyond the national goal, thereby materially advancing the cause of victory for the United States and its Allies.
War Production
EFFICIENCY AWARD
COAL AGE Presents to the Officials and Employees of:
This certificate in honor of their outstanding contribution to the national war effort in the form of increased productive efficiency in 1944 above and beyond the average for the industry, thereby materially advancing the cause of victory for the United States and its Allies.
DUPLEX
BIT
CINCINNATI DUPLEX CHAIN
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CINCINNATI

CINCINNATI CHAINS, BITS AND CUTTER BARS POPULAR WITH MANY AWARD WINNERS

THE Cincinnati Mine Machinery Company is proud to be a part of the Coal Industry . . . proud of the many winners of Victory Production and War Production Efficiency Awards. That these Winners and hundreds of others have done such an outstanding job is a tribute to efficient management . . . to equipment manufacturers . . . and to the army of men deep down in the mines who have played a part in increasing the efficiency of the industry. Naturally we are proud of our contribution in supplying what we believe to be the finest Chains, Bits and Bars, that years of experience, skilled workmanship, and untiring effort can produce.

CINCINNATI CUTTER BAR

Engineered and constructed for heavy duty . . . for long life . . . to withstand bending stresses. Constructed to fit all popular mining machines . . . both regular and thin kerf.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

News Round-Up

Anthracite Strike Settled With $1.37½ a Day Rise for Miners

ANTHRACITE OPERATORS and the United Mine Workers of America accepted in substance May 17 compromise pay terms suggested by Secretary Ickes, estimated to increase miners' earnings $1.37½ a day after nearly 70,000 miners had been idle since May 1 as a result of the contract deadlock. Acceptance of the proposals still left a good deal to be negotiated, according to principals on both sides.

Both sides agreed two days later on the details of a new contract, which the union's scale committee of the three anthracite districts promptly ratified, terming it an "outstanding achievement" and calling upon the rank and file for full production the following Monday, May 21. The new agreement contains provisions for underground travel time pay, overtime for work beyond seven hours a day and 35 hours a week, differentials of 4 and 6c. an hour for second and third shifts, respectively, and $75 instead of $50 vacation allowance.

In response to the Lewis summons, 326 of the total of 333 hard-coal collieries were in operation May 21, according to John J. Forbes, manager of the industry for the government. He said that 93 percent of the industry's manpower of 68,800 were on the job. The seven idle collieries were said to be chiefly in the Schuylkill area.

The War Labor Board began consideration of the new agreement in Washington May 21.

After three days of idleness at the mines Secretary Ickes, as Solid Fuels Administrator, took possession of the mines the night of May 3 on order of President Truman and called on the miners to resume production of coal the following Monday (May 7). Nevertheless, employees of the 363 seized operations sat tight, awaiting word from John L. Lewis, and he was noncommittal except to say that he "would have no statement about anything but the weather" when asked if he would order the miners back to work.

Nine locals of the United Mine Workers, representing 10,000 miners in District 1, voted May 6 to defy the government's order to return to the mines the following day, and continued to sit tight. The following day the men began to register for unemployment compensation, a definite sign that they intended to stick it out. William H. Chesnut, Pennsylvania Secretary of Labor and Industry, declared May 9, however, that the idle miners were not entitled to such payments because they "voluntarily left work without good cause."

Meanwhile, meetings of operator and union representatives in New York failed to show any progress toward an agreement, nor was any comment forthcoming. As a result Secretary Ickes sent an invitation May 8 to both sides to confer with him the following day. But after a meeting with Mr. Ickes lasting an hour and a half there still was no report of progress, and another conference the following morning was equally barren of results.

The government took possession May 7 of two Virginia anthracite mines near McCoy. The Great Valley mine, owned by the Great Valley Anthracite Coal Corp., employs 130 men and produces about 600 tons of coal daily; the other, the Big Vein Merrimac Seam mine, is the property of the Superior Anthracite Mines, Inc., and employs about 100 men, with a daily output of 500 tons.

As the strike entered its third week, May 14, and coal shortage became more acute in the mining region, the Wilkes-Barre Chamber of Commerce, through its president, Joseph MacVeigh, telegraphed President Truman urging him to take a hand in settling the strike. The telegram said: "Rapidly dwindling supplies of anthracite coal make it imperative that mines resume operation immediately. We again urge your attention to this matter, which is very important."

Mr. Ickes clamped emergency controls May 14 on deliveries of anthracite to consumers in a twelve-State eastern area to meet a fuel crisis resulting from a two-weeks' suspension of mining.

Abe Fortas, Acting Solid Fuels Administrator, announced May 23 the removal of the foregoing restrictions. At the same time he urged retail dealers to give immediate attention, upon receiving shipments of anthracite, to the current needs of hospitals, homes for the infirm, dairies, laundries and other essential consumers.

•

May Tax Strip Mines

The Illinois House of Representatives is considering a bill, introduced by Representative Paul Powell, Vienna, Ill., to levy a tax on all strip-mines operated in the State. Powell's measure provides for

"Eddie!—Joe!—Somebody, Quick!—Go buy me a box of vitamin tablets!"

payment of a tax of 4c. per ton of mined coal on mine operators. The proceeds of the tax would be used for revenue to restore lands which had been stripped in such surface mining operations. The measure is intended to replace a similar one passed in 1943, enforcement of which has been blocked by pending court injunction proceedings.

Hearings began May 23 in Columbus, Ohio, on a bill that would require strip operators in Ohio to obtain permits to operate from the Division of Conservation and Natural Resources, it being proposed that the principle of dual control by the Division of Mines and the Agricultural Extension Service be abandoned. It is required that a bond be furnished of $500 an acre, with a minimum of $1,000, for any strip-mining operation to insure faithfur performance of obligations imposed on the operator.

Operators would be required to drain and regrade the land and to plant trees, shrubs or vines on it within a year after they had completed mining operations. Failure to comply with regulations would result in forfeiture of the bonds, and the work would be done by the State Conservation Division. Anyone engaging in strip mining in Ohio without first obtaining a permit would be subject to a fine of $1,000, a year in jail, or both.

A bill designed to enforce reclamation of waste strip land for agricultural purposes, now before the General Assembly of Missouri, it is charged by coal producers in that State, may mean the death knell to strip operation there because of the increase in cost involved.

•

Rejects Plea To Halt Mine Caves

A request of anthracite region (Pennsylvania) lawmakers to act favorably on a bill prohibiting mining of hard coal in such a manner as to cause the cave-in of public highways was rejected May 2 by the House Mines and Mining Committee at Harrisburg. Representative Martin L. Murray (D., Luzerne) urged approval of the measure, but Chairman Earl E. Hewitt Sr. (R., Indiana) said the committee withheld favorable action.

Introduced by Representatives Harold E. Flack (R., Luzerne) and John L. Boney (D., Luzerne), the measure also would have given State and local authorities power to inspect mine workings in connection with mine-subsidence.

The House previously rejected a motion of Mr. Boney to bring to the floor another mine-subsidence prevention measure that would have made it unlawful to cause a subsidence under any property, public or private.

The House at Harrisburg, Pa., overrode Democratic opposition, May 2, to pass—117-71—a bill permitting the Sanitary Water Board to order sealing of abandoned coal mines by operators. Democratic Leader Hiram G. Andrews asserted the measure, which went to the Senate, would impose "an unnecessary burden" on mine owners.

Mine Layout, Education and Fuels A.I.M.E. Subjects at Morgantown

OF A SERIES of modifications of the typical square-block system of mining the Pittsburgh seam, the 60-deg. angle system with 60-deg. mining within the blocks and a flat (90-deg.) pillar line has proved the best in efficiency and recovery for the mobile track mining at Isabella mine of the Weirton Coal Co., Fayette County, Pennsylvania. That theme was developed in a paper by S. M. Cassidy, vice president, and George M. Rigg, chief engineer, Weirton Coal Co., and presented by Mr. Cassidy at a meeting of the Central Appalachian Section of the A.I.M.E., at Morgantown, W. Va., May 11.

Underground storage of gas, scholarship plan of the coal industry in the Central Appalachian Section and coal combustion equipment were other subjects covered. E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky., chairman of the Central Section, presided.

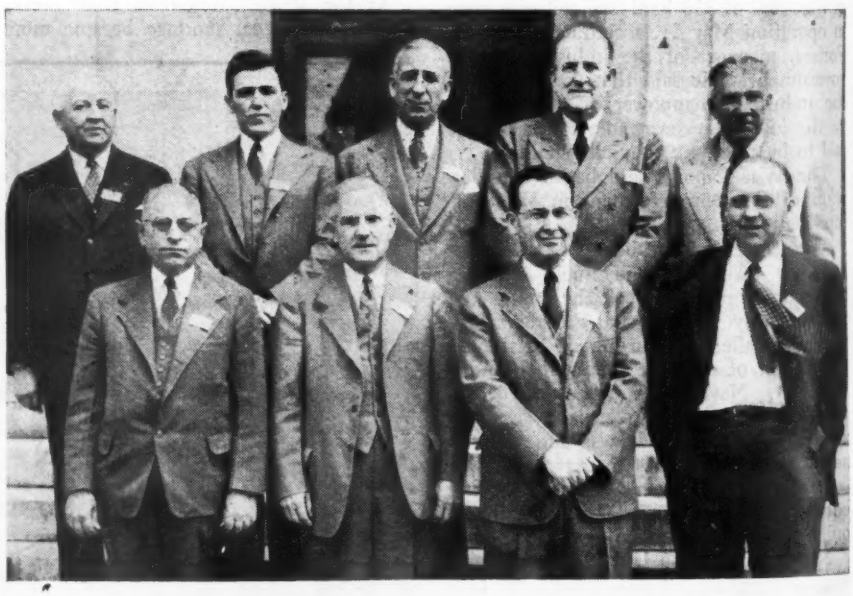
The Weirton paper, briefed by Mr. Cassidy and illustrated by slides, was prepared for the New York A.I.M.E. meeting, which was cancelled. Isabella mine, in 85-in. Pittsburgh coal under cover of 450 to 675 ft., was mechanized in 1937 with shovel-action track-mounted loaders, universal-type track-mounted cutting and shearing machines, 8-wheeled 10-ton mine cars and a washing plant designed to handle complete seam mining, which includes 10 to 13 in. of drawslate (*Coal Age*, July, 1938, pp. 49-83).

Early in the work it was determined that an angle layout making diamond-shaped blocks gave the best results. Each loading machine operates "in a little mine all its own"; that is, it works alone in a panel which it develops and robs. Experiments with several variations of the angle work have led to a system which in production per unit and per man-shift has beat all others and is now standard throughout the mine.

A block of coal roughly 1,200 ft. wide and 1,800 ft. long is developed through the middle by driving seven or eight 12-ft. headings which, with their breakthroughs, afford the 16 or more working places that are required for maximum efficiency. As the development approaches the end of the panel the breakthroughs or rooms are extended right and left and additional headings driven to develop a fan shape which at the end spans the entire width of the panel. The 1,200-ft. rib or pillar line, at 90 deg. to the development, is started full length.

At first it was thought that 14 places would suffice for a unit; that is, provide the extra places for timbering, material recovery and so on. Later the system was changed to provide 18 places. Use of fewer than 16 places results in a drop in tonnage.

All lifts in pillar recovery are 20 ft. wide and the block (pillar) is taken out in four lifts. With the present 60-deg. work, extraction within the block is 85 percent compared with 77 percent experienced when trying a 45-deg. layout. Hand loading with 90-deg. blocks gave only 83 percent, due in part to the roof troubles and bottom heaving resulting



Section officers and speakers in front of the Mineral Industries Building at West Virginia University. Back row: A. S. Shoffstall, International Nickel Co., vice chairman; S. M. Cassidy, vice president, Weirton Coal Co.; E. R. Price, Inland Steel Co., chairman; Julian E. Tobey, Upper Monongahela Valley Association, and Veleair C. Smith, consulting engineer. Front row: H. J. Wagner, Public Service Commission of West Virginia; C. E. Lawall, president, West Virginia University; Harry G. Kennedy, Kanawha Coal Operators' Association; Charles T. Holland, West Virginia University, secretary-treasurer.

WW—Then... BUYERS WILL BE CHOOSERS

...and Coal will have to be SOLD*!

TODAY *demand* for coal exceeds supply—a wartime condition. Tomorrow *supply* will exceed demand—and each operator must again compete for a share of *smaller* over-all consumption volume.

In that competition *clean* coals—of low impurity content, correct sizing, and uniformity—will win the better markets—the higher prices.

They did *before* the war.

That's why, by 1941, about ⅓ of all mines in this country had mechanized below and *above* ground.

Of that ⅓ a very high percentage are Morrow equipped—because Morrow Tipples improve coal quality, raise product value, cut operating costs. Morrow *streamlines production* from the mine, through modern, efficient preparation equipment, to cars and barges, in shorter time, at lower costs—in the best condition to SELL!

★ ★ ★

Morrow engineers are available now to design and equip more efficient preparation plants. Ask Morrow to assign an engineer to study your situation. Write The Morrow Manufacturing Company, 1944 Ford Blvd., Wellston, Ohio. Division The Wacker Corporation.

* Better Preparation
= *INCREASED SALES!*

1. low impurity content
2. correct sizing
3. high uniformity

MECHANIZE WITH MORROW

COAL WASHERS • WEIGH PANS • FEEDERS • DUMPS
BINS AND BIN GATES • FLANGED LIP SCREENS
CONVEYORS • LOADING BOOMS • SHAKING SCREENS
VIBRATING SCREENS • CAR HAULS • PICKING TABLES
SETTLING TANKS • ELEVATORS • CAR RETARDERS
PERFORATED METAL SCREENS • STEEL STRUCTURES

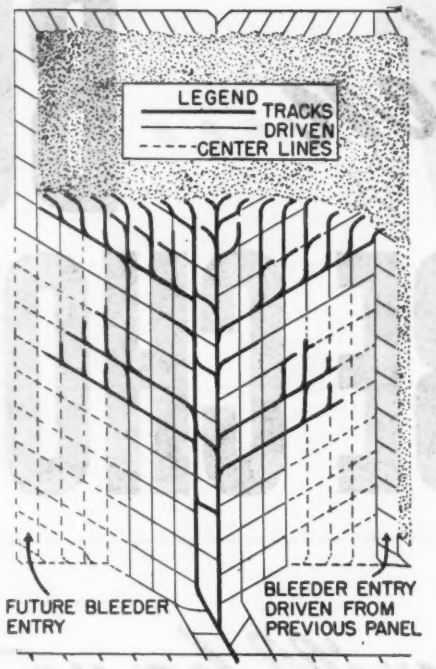
from slower recovery. Mechanical work in the old 90-deg. layout gave 80 percent recovery within the block.

D. L. McElroy, chief engineer, Consolidation Coal Co., referring to some attempts at robbing pillars on flat rib lines in the vicinity of Fairmont, suggested that perhaps success with the method depends largely on close supervision. Joseph Pursglove Jr., president, Pursglove Coal Mining Co., called attention to the several Isabella "firsts": (1) first to go to complete mechanical loading in the coke region; (2) first to adopt a car (10-ton) larger than any other used in a coal mine at that time; (3) first to install special passenger cars for man-trips; and (4) first to load the whole seam in that region.

Most of the twelve operators' associations in the Central Appalachian Section have already appointed members to serve on the section's committee to supervise the "Scholarship Plan, Central Appalachian Section, A.I.M.E.," said Harry G. Kennedy, secretary, Kanawha Coal Operators' Association and chairman of the committee. To those in attendance at the meeting he distributed printed leaflets outlining in general the aims and provisions of the scholarship plan.

Each year a total of three new $300 per year scholarships to the universities of West Virginia and Kentucky and to Virginia Polytechnic Institute will be available to high school graduates in the central Appalachian section. After the third year of the plan there will be twelve scholarships in effect. The awards will be made by a committee consisting of the heads of the mining departments of the three schools. This scholarship committee will endeavor to obtain work for the students in and around coal mines during the summer vacations after the freshman, sophomore and junior years.

Fifteen companies are operating 40 underground storage pools for gas in the eastern part of the United States, said H. J. Wagner, chief of the gas section, engineering department, West Virginia Public Service Commission. Indicating that this type of storage is practical for manufactured gas, there is one such operation at the present time in the Appalachian area. It, however, is a leveling storage for furnace gas.



Present system at Isabella mine. The same crew that develops the panel brings back the pillars, starting them on a flat line that is maintained to the finish.

Mr. Wagner said it is reasonable to anticipate that some time in the future coal will be the chief source of fuel in the United States and that gas made from it will largely supply the natural gas markets. A new development is an investigation of the possibility of storing gas in porous sands that are not gas-bearing. That would solve the problem of storage close to critical areas such as Cleveland.

Taking some information from a paper published in England and using blackboard sketches, Mr. Wagner outlined the Russian experiments of 1933 to 1940 in underground gasification of coal seams, both horizontal and steeply pitching. No information has been made public on the work since 1940.

The storage pools in use in the eastern part of the United States range in size from 50 acres to 25,000 acres. The pools contained approximately 65 billion cu.ft. of natural gas on Nov. 1, 1944, and from then until March 1, 1945, delivered 18.5 billion cu.ft. into lines of the operating companies. Mr. Wagner said that no doubt Texas gas will go into storage in the Appalachian area this summer.

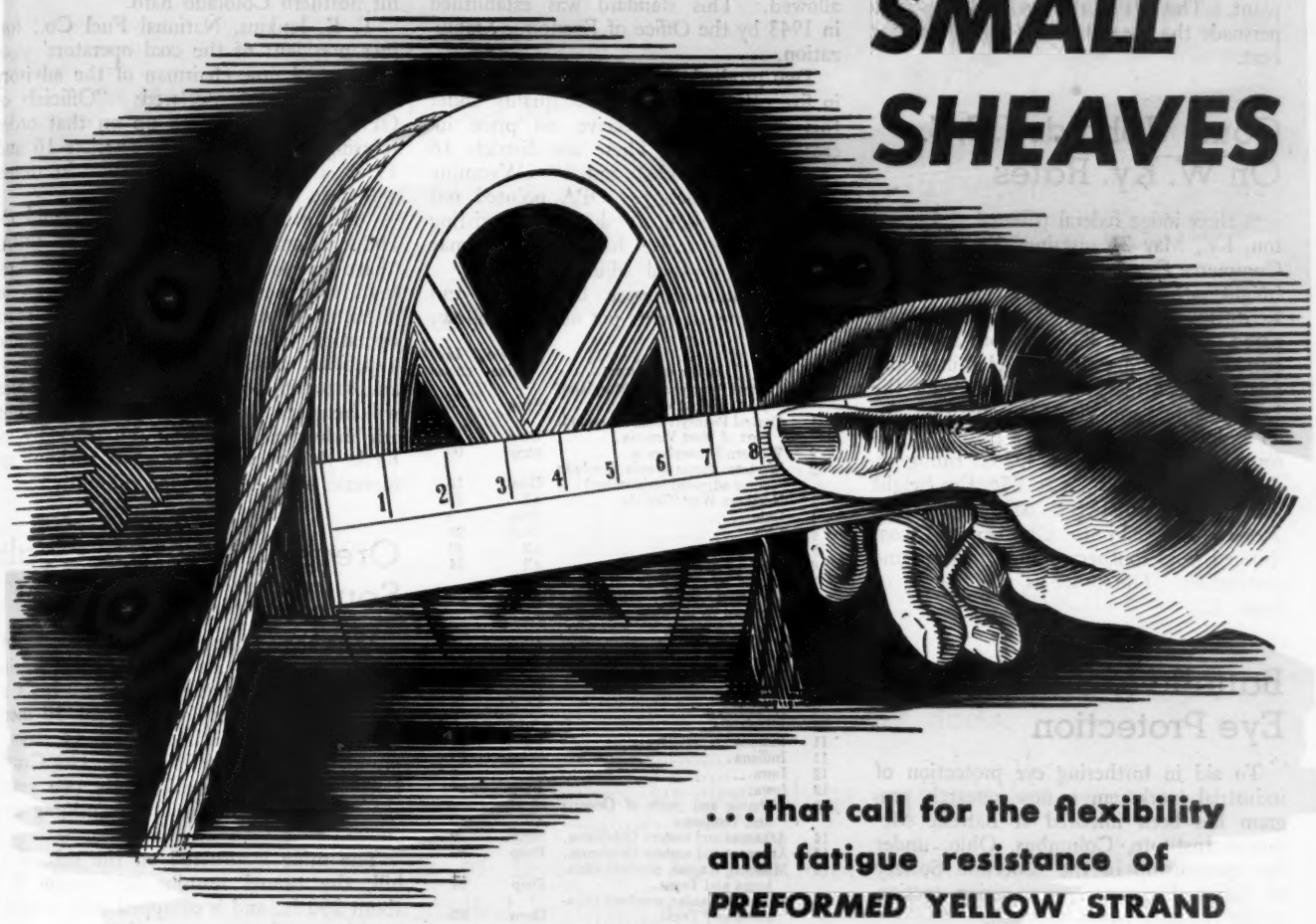
Because of the few power and steam plants built or improved during the depression years, the war shortages and the burn-outs through hard service, there is a 15-year pent-up demand for boilers, stokers and similar equipment to improve plants, according to Julian E. Tobey, managing director, Coal Bureau, Upper Monongahela Valley Association. He deplored the inflexibility that limits fuel choice for the average plant and on it blames the high customer turnover, which he said reaches 50 to 70 percent.

Of the industrial plants, 10 percent can burn a wide range of coals with good efficiency and satisfaction. Fifty percent cannot burn any type of coal with good efficiency and only 40 percent can burn one type with even fair efficiency. This war has proved that a change of fuel will shut down certain plants.

Inflexibility has come about through destructive bidding and through placing stokers and other new equipment under old boilers where space was limited. When a reputable power-equipment manufacturer or supplier bends to the pressure of a lower bid from a questionable firm, the original specifications and dimensions

Employees of the Davis Coal & Coke Co., Coketon, W. Va., are shown here just before the ceremonies at which "Coal for Victory" awards were presented. David Watkins, international representative, United Mine Workers of America, presented "Coal for Victory" emblems to the men, congratulated them on their production efforts during 1944 and urged them to continue the good work until the war was won.

We still have with us . . . SMALL SHEAVES



. . . that call for the flexibility and fatigue resistance of *PREFORMED* YELLOW STRAND

In a lot of equipment lines, old and new models will have one feature alike: small sheaves—perhaps accompanied by small drums. Either is tough on wire rope. Both should remind you to *minimize* their fatiguing effect by using *Preformed* Yellow Strand.

While reasonable bending is expected of unpreformed rope, severe bending tends to break down the steel itself. High speeds, heavy loads and reverse bends all hasten a premature end.

The *flexibility* of *Preformed* Yellow Strand enables it to hold its own *longer* against fatigue. Its wires and strands can concentrate on the *external* bending job, because *internal* stresses have been virtually neutralized during manufacture. Instead of having been forcibly twisted into place, the parts have been preshaped to the spiral curvature they keep in the finished rope.

Along with greater endurance, smooth-running *Preformed* Yellow Strand offers faster installation . . . higher kink-resistance . . . increased protection for workmen.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Wire Rope for Mining" contains useful facts, tables, pictures. Write for your copy.

BRODERICK & BASCOM
Yellow Strand
PREFORMED WIRE ROPE

usually are trimmed to the point where satisfaction can be had only with strict adherence to one type of high-quality coal. Better efficiency and the advantages of flexibility take care of the cost of a good plant. The job of the coal industry is to persuade the buyer to insist on getting the best.

•

Court Upholds I.C.C. On W. Ky. Rates

A three-judge federal tribunal at Lexington, Ky., May 21 sustained the Interstate Commerce Commission order reducing the freight rate on coal hauled from western Kentucky to Chicago. The decision, prepared by Judge H. Church Ford and Concurred in by Judges Elwood Hamilton and Shackelford Miller, refused to set aside the I.C.C. order and denied a petition for an order restraining the I.C.C. from enforcing the order. The I.C.C. ruling reduced from 35c. a ton to 25c. the freight rate differential between coal shipped from western Kentucky to Chicago and coal shipped from southern Illinois to the same destination. The order is effective as of June 1.

•

Battelle to Study Eye Protection

To aid in furthering eye protection of industrial workmen, a new research program has been initiated at Battelle Memorial Institute, Columbus, Ohio, under the sponsorship of the American Society of Safety Engineers, engineering section of the National Safety Council.

To involve a year of investigation, the program is intended to provide information that will be used by safety experts and eye-protector manufacturers to help in combating the some 75,000 disabling eye injuries and several hundred thousand non-disabling injuries that occur annually in American industry. The investigation will apply particularly to the evaluation of the performance requirements and specifications of satisfactory eye protectors, which are now finding increasing use in industry.

•

Ceiling Boost Denial Protested in Colorado

Increases averaging 16c. a ton have been allowed in producers' ceiling prices for bituminous coal to compensate in part for higher costs occasioned by the increase in miners' wages under the new agreement, the Office of Price Administration announced May 1, effective immediately. The increases, ranging from 4c. to 55c., cannot, OPA has found, generally be absorbed by coal dealers and so must be passed on to consumers. The increases will average less than 2 percent of the retail price.

OPA said the wage increases would boost operating costs about 21c. a ton on an industry-wide basis, of which producers will absorb 5c. Wherever the wage increases reduce a producing district's operating margin either below 15c. a ton or below its 1942 margin, whichever is greater, increases in ceiling prices for coal are allowed. This standard was established in 1943 by the Office of Economic Stabilization.

Two producing districts and strip mines in five other districts do not qualify under this standard and receive no price increase, OPA says. These are districts 16 (northern Colorado) and 19 (Wyoming and part of Idaho). OPA pointed out that where producers show that existing price ceilings cause hardship they may apply for individual adjustments.

The ceiling increases, by districts and type of mine, in cents per net ton, follow:

District	Location of District	Type of Mine	Increase
1	Central Pennsylvania, Maryland, Part of West Virginia	Strip	0
1	Central Pennsylvania, Maryland, part of West Virginia	Deep	18
2	Western Pennsylvania	Strip	09
2	Western Pennsylvania (Include some adjusted strip mines)	Deep	14
3	Northern West Virginia	All	23
4	Ohio	Strip	0
4	Ohio	Deep	26
5	Michigan	All	40
6	West Virginia Panhandle	All	24
7	Part of West Virginia and part of Virginia	All	26
8	Southern West Virginia and parts of Virginia, Kentucky, Tennessee and North Carolina	All	15
9	Western Kentucky	Hand	20
9	Western Kentucky	Other	06
10	Illinois	Hand	20
10	Illinois	Machine	09
10	Illinois	Strip	0
11	Indiana	Hand	20
11	Indiana	Others	09
12	Iowa	Strip	0
12	Iowa	Deep	27
13	Alabama and parts of Georgia and Tennessee	All	40
14	Arkansas and eastern Oklahoma	Strip	0
14	Arkansas and eastern Oklahoma	Deep	55
15	Missouri, Kansas, northern Oklahoma and Texas	Strip	04
15	Missouri, Kansas, northern Oklahoma and Texas	Deep	35
16	Northern Colorado	All	)
17	Southern Colorado and part of New Mexico	All	25
18	California and part of New Mexico	All	30
19	Wyoming and part of Idaho	All	0
20	Utah	All	25
22	Montana	All	30
23	Washington, Oregon and Alaska	All	45

There are 22 districts in all, there being no District 21.

Operators in Districts 16 and 19 said May 2 that they would make an appeal from the OPA ruling. Howard B. Crandall, president, Clayton Coal Co., said: "If the discrimination against districts 16 and 19 is allowed to stand, quite a few mines will have to close. The order will hit northern Colorado hard."

T. E. Jenkins, National Fuel Co., former president of the coal operators' association and now chairman of the advisory committee, SFA, declared: "Officials of OPA will have to back up on that order refusing price increases to districts 16 and 19 or a lot of northern Colorado mines will have to close."

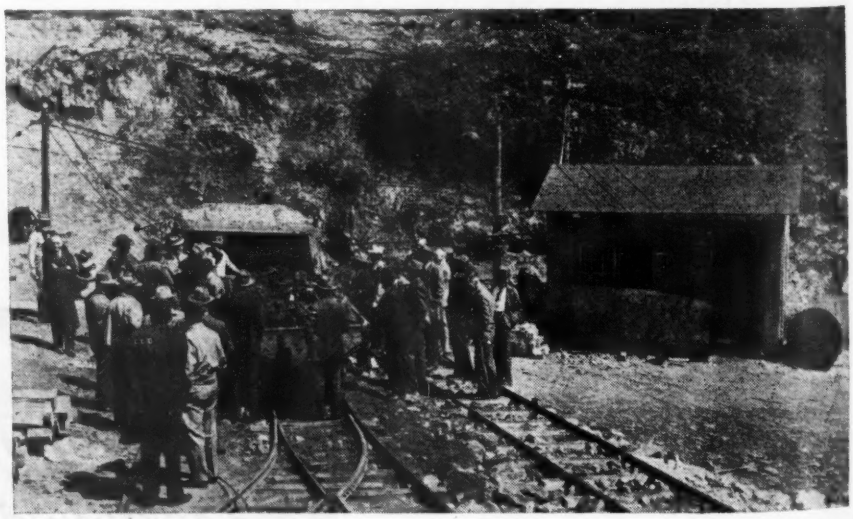
"The mine operators," said Harold O. Hill, regional price executive of OPA, "have a simple remedy if this refusal to grant price ceiling increases in districts 16 and 19 interferes with their operation. Each mine is entitled to file a petition with the OPA regional office, and show its books. No blanket increase will be given either of these districts, but any individual mine that can show by its books that it cannot operate without an increase will be given one promptly."

•

Oregon Now Has Coal: Southport Mine Open

With the opening of the old Southport mine, Coos Bay, April 20, Oregon again became a coal-producing State. It is a small operation, employing about 30 men on a 24-hour-a-day schedule. T. O. Toon, president of the new company, The Coast Fuel Corp., began work nearly two years ago, with W. A. Wilson, his mining engineer.

The mine is situated on the side of a hill, the tunnel running in straight for about 200 ft., and is equipped with cutting machines and a conveyor that carries the coal to cars for transmission to the washers. Output is about 300 tons a day, but Mr. Toon says he hopes to reach a daily peak of 1,000 tons soon. The property now being worked is estimated to contain about 900,000 tons of coal, and Mr. Toon says larger deposits have been located on adjoining land controlled by the corporation. Max Bennet is secretary of the company.



First car of coal from Southport mine.

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- Wet or dry, Simplex-ANHYDREX Underground cables operate efficiently.
- They need neither lead sheath or other metallic protection from moisture.
- They may be installed with or without ducts.
- They are not subject to electrolysis or corrosion.
- Millions of feet of ANHYDREX cables were made and installed before the war.
- Thanks to Simplex laboratories and engineers, Simplex-ANHYDREX cables insulated with specially treated and compounded Buna rubber have the same high resistance to water absorption as the prewar product.

Simplex-ANHYDREX Underground cables are the final answer under many conditions to a problem as old as the electrical industry.

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WIRES and CABLES

Portal-to-Portal Pay Upheld by High Court

Portal-to-portal pay for bituminous coal miners was upheld in the Supreme Court May 7 by a 5 to 4 decision. The ruling was on an appeal by the Jewell Ridge Coal Corp., operating two mines in southwestern Virginia, attacking a Circuit Court decision construing travel time as work, for which pay is mandatory under the Federal Wage and Hour Act.

Justice Murphy—joined by Justices Hugo L. Black, Stanley F. Reed, William O. Douglas and Wiley Rutledge—delivered the opinion, holding that "there is no substantial factual or legal difference between this and the Tennessee Coal case," in which the court granted portal-to-portal pay to iron miners.

Underground travel in bituminous coal mines, Justice Murphy pointed out, "bears all the indicia of work"—physical or mental exertion, exertion controlled or required by the employer, and exertion pursued for the benefit of the employer and his business—and said that "to conclude that such subterraneous travel is not work is to ignore reality completely." He characterized prior customs or contracts in the industry as "immaterial" in arguing that the act "was not designed to codify or perpetuate those customs and contracts which allow an employer to claim all of an employee's time while compensating him only for a part of it."

The majority opinion thrust aside arguments as to high pay, saying "employees are not to be deprived of the benefits of the act simply because they are well paid or because they are represented by strong bargaining agents." It pointed out that certain modifications and adjustments in existing customs and contracts may be required in some instances and that the plain language and policy of the act would be frustrated if such changes were not made. Also it held that the Wage and Hour Administrator's interpretations on travel time lack "the usual respect to be accorded the Administrator's rulings" by reason of being "legally untenable."

Justice Murphy's opinion closed with the statement: "Thus shall each of the petitioner's miners receive his own reward according to his own labor," preceded by a statement that no intimation is made concerning the validity of agreements whereby, in a bona-fide attempt to avoid complex difficulties of computation, travel time is averaged or fixed at an arbitrary figure for all underground employees.

Justice Jackson's dissenting opinion takes issue with the statement that the Tennessee Coal case must be considered as a precedent by saying that "the Tennessee case differed from this as night does from day" and charged that the court declined to look at the record of factual differences, casting them out as being immaterial. In supporting the "face-to-face" basis of pay, Justice Jackson outlined the background of this industry custom and said: "Under this decision there can be no uniform wage in this industry except by disregarding the very duty which this decision creates to pay each miner for his actual travel time." He further stated: "We cannot shut our eyes to the consequence of this decision, which is to impair for all organized labor the credit of collective bargaining, the only means left by which there could be a reliable settlement or marginal questions concerning hours of work or compensation."

The dissenting opinion objected to the decision on the ground that: (1) It either invalidates collectively bargained agreements or ignores their explicit terms; (2) such procedure is not authorized by any word of Congress, and Congress did not intend the act to interfere with collectively bargained agreements; (3) Congress withheld interference with collectively bargained contracts at the request of U.M.W.A. and expressed a policy to observe and preserve collectively bargained arrangements in the coal-mining industry, in the Bituminous Coal Act of 1937; (4) the decision is contrary to interpretations of the Wage and Hour Administrator made upon recommendation of the United Mine Workers; (5) the decision invalidates the basis on which the government itself has operated the mines and raises the question of the validity of the government's strike settlements and of all existing miners' agreements; (6) the decision proceeds on a principle denied to unorganized workmen, for whose benefit the act was passed.

COAL ACTIVITY

Bituminous Coal Stocks

	Thousands Net Tons Apr. 1 1945	—P.c. Change— From Mar. 1 1945	From Apr. 1 1944
Electric power utilities	12,519	−3.1	−10.6
Byproduct coke ovens	5,452	−2.8	−13.2
Steel and rolling mills	725	+8.9	− 5.2
Railroads (Class I)	9,964	−2.2	+ 0.7
Other industrials*	13,178	−0.6	−17.4
Total	41,838	−0.9	−11.8

Bituminous Coal Consumption

	Thousands Net Tons March 1945	—P.c. Change— From Feb. 1945	From March 1944
Electric power utilities	6,187	− 0.4	−5.4
Byproduct coke ovens	8,060	+11.7	−0.7
Steel and rolling mills	938	− 0.4	−8.0
Railroads (Class I)	11,411	+ 6.2	−5.2
Other industrials*	12,982	− 1.1	−7.2
Total	39,577	+ 3.5	−5.1

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

April, 1945, net tons	43,350,000
P.c. change from April, 1944	−17.2
January-April, 1945, net tons	194,810,000
P.c. change from Jan.-April, 1944	− 7.0

Anthracite Production

April, 1945, net tons	5,307,000
P.c. change from April, 1944	+ 2.0
January-April, 1945, net tons	19,185,000
P.c. change from Jan.-April, 1944	−11.5

Sales, Domestic Stokers vs. Oil Burners

	Stokers	Burners
March, 1945	6,473	6,436
P.c. change from Mar., 1944	+261.0	+183.5
January-March, 1945	16,478	15,904
P.c. change from Jan.-Mar., 1944	+251.9	+115.3

Index of Business Activity*

Week ended May 19, 1945	235.4
Month earlier	237.3
Year earlier	236.2

* *Business Week*, May 26.

Electric Power Output†

Week ended May 19, 1945	4,329,605,000
P.c. change from month earlier	−1.9
P.c. change from year earlier	+0.9

† Edison Electric Institute.

New Plant Opened For Packaged Fuel

Coal in packaged form made its debut in the East last month when the Blaw-Knox Co., Pittsburgh, opened a 500,000-ton-a-year factory at Philadelphia for the manufacture of "White Glove" packaged fuel. The company operates a similar but smaller plant at Pittsburgh.

The fuel will be marketed locally in the Philadelphia area both by the company direct and by selected retail outlets.

"White Glove" fuel is a mixture of 80 percent anthracite fines and 20 percent bituminous fines, held together with an asphalt binder. The company says it has a Bureau of Mines rating of 14,000 B.t.u. Pocahontas No. 3 is being used currently as the bituminous fines and the anthracite is from Jeddo No. 7 colliery of the Jeddo-Highland Coal Co.

The coal is taken from stockpiles by a conveyor system to cone-shaped storage bins, where it is poured into a cylindrical dryer. It is then pulverized and mixed, the binder added, and pressed into 3-in. cubes, 16 at a time. The cubes are carried from the press on a conveyor to the packaging room, where they are wrapped, six to a package, in orange paper. Each package weighs 7½ lb., and a ton of the fuel may be stored in a space 54x45x18 in. The makers assert nearly four times as much package fuel may be stored in a cellar as loose coal.

"White Glove" fuel, Blaw-Knox says, is completely clean, requires no bin for storage, will burn virtually smokelessly and leaves a fine white ash.

Roof Test Research Progresses at Lehigh

Progress is being made at Lehigh University, South Bethlehem, Pa., in the roof-testing research program sponsored by the General Reinsurance Corp. in cooperation with the Anthracite Institute. The latest developments in the study, which are being verified by actual underground tests at a mine of the Lehigh Valley Coal Co., foreshadow the possibility of developing an electronic device capable of picking up the vibrations caused by the plow made from a testing tool, amplifying these vibrations and thus making it possible for the tester to determine whether the mine is solid or loose. The amplifying device, including the power for its operation, is small enough to fit into one's pocket or to be carried conveniently on a belt.

The research at Lehigh is being conducted by Dr. Robert T. Gallagher, department of mining engineering, and Dr. Cornelius G. Brennecke, department of electrical engineering.

The Right Truck for All Trades

There is a place for a pick-up in every business

Chevrolet's popular pick-up truck is in production again—because the Government recognizes the importance of this versatile vehicle to agriculture, industry and trade, and their need for replacements. . . . Of course, production is limited—still, thousands of essential users will be enabled to procure these high-utility units. (Better see your Chevrolet dealer now, if your business makes you eligible to purchase a new truck.)

There is hardly a farm or a tradesman or an industry that cannot use a pick-up to good advantage—especially a *Chevrolet* pick-up, with its unequaled combination of low price and high quality, plus its famous Chevrolet efficiency and economy of operation, its long life and durability.

These 1945 models are *all-Chevrolet*—with chassis, cab and pick-up box engineered and built by Chevrolet to meet Chevrolet's exacting standards of excellence.

Don't delay . . . see your Chevrolet dealer *now* and discuss your transportation and service requirements.

QUALITY FEATURES

- **STANDARD VALVE-IN-HEAD TRUCK ENGINE**
- SIX CYLINDERS
- 90 HORSEPOWER
- **CHASSIS**
- RECIRCULATING-BALL STEERING GEAR
- SHOCK ABSORBERS
- FULL-LENGTH BODY SUPPORT
- 6.50-16, 6-PLY TIRES
- SYNCRO-MESH, 3-SPEED TRANSMISSION
- HYPOID GEAR REAR AXLE
- HYDRAULIC BRAKES
- STABILIZED FRONT END
- 18-GALLON FUEL TANK
- MONORAIL SPARE TIRE CARRIER
- **CAB:** ALL-STEEL, STREAMLINED
- FULL-WIDTH SEAT
- ADJUSTABLE CUSHION AND BACK
- V-TYPE VENTILATING WINDSHIELD
- SAFETY GLASS ALL AROUND
- **BODY:** INSIDE, 78 x 48½ x 16¼ INCHES
- MOISTURE-PROOF WOOD FLOOR
- UNOBSTRUCTED FLOOR (NO WHEEL-HOUSINGS)
- ANTI-RATTLE TAIL-GATE
- TUBULAR STEEL SIDE FLARE BOARDS

ONE OUT OF EVERY THREE TRUCKS IS A CHEVROLET

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BUY MORE WAR BONDS . . . HELP SPEED THE VICTORY

CHEVROLET *Pick-up* TRUCKS

Strike of Foremen Renders 3,500 Idle

Eighteen major coal mines in Monongalia County, West Virginia, were closed May 14, making about 3,500 men idle, as foremen stayed away from work in their campaign for union recognition. Complete shutdown in that section of the northern West Virginia field seemed likely because of demands of Local 160 of the United Clerical, Technical and Supervisory Employees' Union.

A few days later the stoppage spread to Marion County, with 287 men idle at the Christopher No. 4 operation, Four States.

John MacAlpine, president of the foremen's union, said that the stoppage was a protest against War Labor Board action which overrode recommendations of a special panel stipulating that supervisory employees should receive higher pay than those they supervised. Although conceding that the walkouts were unauthorized, MacAlpine said: "I think they are justified in leaving their jobs where a differential has not been maintained. Lots of supervisory employees," he said, "receive less now than the men they supervise."

The bosses turned out for work May 28 in normal Monday-after-payday numbers in northern West Virginia, McAlpine having called off the strike, which affected 28 major operations and made 9,000 idle at its peak.

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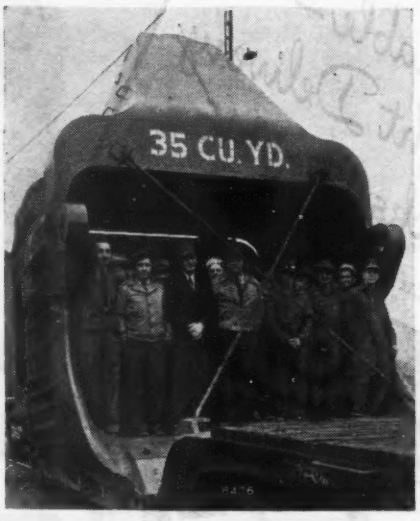
Progressive Pact Wins NWLB Approval

A contract between the Coal Producers' Association of Illinois and the Progressive Mine Workers of America, District 1, according to an announcement May 15 by William H. Davis, Director of Economic Stabilization, was unanimously approved April 25 by the National War Labor Board. A finding by OPA as to the effect of the contract was not necessary, as the Illinois producers accepted the industry-wide price increase authorized for the bituminous coal industry April 30.

Dissatisfaction over wage increases granted under the new U.M.W. contract caused about 5,000 miners in 15 mines in western and central Pennsylvania to strike during the first week in May, and these were joined late in the week by nearly 4,000 more at six other mines. The first group were ordered back to work May 7 by the Federal Government.

In northern West Virginia, more than 1,000 miners quit work May 17. In this case, however, according to William Blizzard, U.M.W. vice president of District 17, the dissatisfaction was over the dearth of meat for workers' dinner pails. The following day it was reported that four more Marion County mines shut down, also because of meat shortage. On the same day, 300 miners of the Elk Horn Coal Corp., in Kentucky, went on strike after appealing to company store officials for more meat and lard.

Incidentally, the *United Mine Workers Journal* of May 15 takes a whack, editorially, at OPA, price control and rationing, saying that those engaged in heavy industry, such as coal mining, require an adequate meat diet that builds and maintains muscle, adding: "Coal miners cannot produce coal on coca cola, a doughnut and a cigarette for breakfast; macaroni and peas, a peanut butter sandwich and a cookie for lunch, and for dinner rice, beans, cabbage, potatoes and cocoanut custard pie."



To emphasize the size of the new strip shovel being assembled for the Fidelity mine of the United Electric Coal Cos., Peoria, Ill., this group poses on the lip of the 35-cu.yd. bucket. The shovel, a Marion 5561, is expected to be in operation this month.

Because of continued inactivity, the three mines of the Carter Coal Co. in West Virginia were taken over May 3 by Secretary Ickes, for the government, and the following day possession was taken of 33 more mines: 15 in Pennsylvania, 2 in Ohio, 6 in West Virginia, 7 in Kentucky, 2 in Illinois and 1 in Tennessee. Government possession of the Palmer mine, at Tracy City, Tenn., was terminated May 9 and the property was turned back to its owner, the Tennessee Consolidated Coal Co.

Mr. Ickes reported May 16 that employees of the Carter mines were back at work after being idle since May 1.

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Organize Truck Firms

J. A. Schuster, Lynch, Ky., and Archie Craft, Thornton, Ky., have organized the Poplar-Elkhorn Coal Co. at Thornton to develop large truck mines. Mr. Schuster also has organized the Joyce Coal Co. to develop an Elkhorn coal area on Bottom-fork Creek near Mayking, Ky.

S. E. Adams and Dr. E. G. Skaggs, as the Skaggs Coal Co., have completed a loading ramp for truck coal mines at Mayking, beside the Louisville & Nashville R.R. tracks, at a cost of $20,000. Twenty truck operations will load from the new facility.

Brownout Lifted With V-E Day

The Office of War Utilities of the War Production Board announced on May 8 the revocation of Utilities Order U-9 (the brownout order), effective as of the announcement of victory in Europe by President Truman. During the three months and eight days, beginning Feb. 1, the brownout was in effect—the period of the nation's most critical fuel shortage of the war—it saved a half million tons of coal, according to Edward Falck, OWU director.

Published assertions that either coal or fuel-oil supplies for civilians will be more plentiful next winter than last are untrue and mislead consumers, the Solid Fuels Administration for War announced in a joint statement issued May 3. Secretary of the Interior Harold L. Ickes, who administers both agencies, said: "We hope to have enough home-heating oil to supply present consumers next winter with as much fuel oil as they had in the last heating season, but there will not be more. There may be even less. To say that it will be more plentiful is certainly erroneous. And there is no likelihood that coal users whose quotas have been reduced can turn to fuel oil for relief. The defeat of Germany will not end fuel shortages. Coal supplies will be deficient because of decreasing mine manpower, and fuel oil for civilian use will be restricted by heavy military requirements in waging war against the Japs."

Consumers were asked May 8 to stock as much bituminous coal as possible this summer by J. A. Krug, chairman, War Production Board, in a letter to 25,000 members of coal-using industries. He warned that because of losses sustained thus far and manpower conditions "the deficit in coal production will be greater than in any previous coal year of the war."

Amendment No. 5 to SFA Regulation No. 26 modifies 1945-46 retail fuel regulations by lifting a restriction that limited deliveries of Appalachian mine bituminous coal before Sept. 1 to 50 percent of a consumer's normal annual needs. Acting Deputy Solid Fuels Administrator Dan H. Wheeler emphasized that there has been no improvement in the supply of these coals, the change being made to enable retailers and truckers to make the most efficient use of trucks and manpower during the summer.

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Association Activities

Virginia Coal Operators' Association reelected George H. Esser as president, secretary and treasurer at its annual meeting; H. W. Meador, vice president; and A. H. Robinson, assistant secretary-treasurer. E. H. Humphrey and C. F. Connelly will continue to serve as directors on the board of the Southern Coal Producers' Association. Mr. Humphrey will act as National Councillor from that coal group to the U. S. Chamber of Commerce.

● *Skimming over forests, jungles or open country . . . hurdling mountains, valleys, rivers, our Army Air Forces can lay combat telephone wire (Okonite plants make thousands of miles a month) at speeds up to 110 miles an hour. Using equipment developed by the Signal Corps, two continuous five-mile circuits can be paid out during a single flight of a light "grasshopper" plane.*

but here's where *OUR* speed counts

● At home the 7th War Loan is on . . . one mighty effort instead of the two we had up to this time last year . . . a challenge to all of us in industry to get quickly and solidly behind our local bond drive.

Sure — it's a big job to top our quota. Everything about this war is big including our responsibility to those in uniform. Our fighters are depending on us at home to put our job over. It's the least we can do for them — and the War Bond purchase window is the place where your speed counts most now.

OKONITE

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ARMY NAVY

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4081

Anthracite Engineers Cite Silt Progress

A symposium on the treatment of breaker waste water and disposal of the solids featured the spring meeting of the anthracite section of the American Institute of Mining and Metallurgical Engineers, May 18, in Pottsville, Pa. Papers were presented by representatives of the Glen Alden Coal Co., Philadelphia & Reading Coal & Iron Co. and the Lehigh Navigation Coal Co.

C. D. Rubert, superintendent of preparation, Lehigh Navigation Coal Co., reviewed figures showing the magnitude of the problem and called attention to legislation recently enacted by the State of Pennsylvania. He outlined briefly the history of wet-process coal preparation and pointed to the fact that the anthracite industry increased its production of sizes smaller than barley from 3.7 percent in 1941 to 5.5 percent of the total commercial production in 1944.

"The Thickening and Settling of Breaker Wash Water Solids" was treated in a paper by W. J. Parton, supervisor of flotation projects for the Lehigh Navigation Coal Co. H. A. Dierks, Glen Alden Coal Co. mining engineer, discussed in detail "Disposal of Solids in Breaker Waste Water by Mine Flushing." Dal Ingersoll, division superintendent, and W. C. Muehlhof, chief engineer, Philadelphia & Reading Coal & Iron Co., collaborated in presenting a paper entitled "The Disposal of Solids in Breaker Waste Water by Impounding in Surface Basins."

Mr. Parton described settling and thickening equipment, the factors that influence the settling of solids, and outlined the tests that can be made to determine the size of settling facilities that may be required for particular conditions. He also discussed settling-tank designs and several methods of settling procedure. He explained that numerous agents are known that have the ability to flocculate semi-colloidal material in water suspensions and thus increase the settling rate. The use of starch solutions to increase the settling rates of slurry solids give the most promise, he said. This substance is employed by the Lehigh Navigation Coal Co. in its water clarification at the Lansford colliery. Various starches, such as potato, corn, wheat and tapioca, can be used, but potato is the most efficient for the purpose. The same company, at its new flotation plant near Tamaqua, employs a tank of sufficient diameter (180 ft.) to permit the settling of solids, resulting in a clear overflow without the use of a flocculent.

In his talk on underground flushing, Mr. Dierks said it has had an important part in mining operations, particularly in the Northern field, where favorable natural conditions, such as flat pitch and shallow depth of workings, make underground flushing comparatively easy and inexpensive. Application of flushing also was favored because in the Wyoming field a high percentage of mining is done under cities and boroughs, with numerous dwellings, public buildings, factories, railroads and highways all requiring surface protection. There is hardly a mine in the Wyoming field that has not done some silting in the past or is not doing it at present.

In addition to flushing of silt with breaker waste water, disposal by other means, such as compressed air, is possible and has been done, said Mr. Dierks. A pneumatic silting operation is carried on at present by the Hudson Coal Co., although on a very limited scale. The Hudson company is blowing dry silt with compressed air into voids between the roof of a high cave and the top of steel timbers covered with a concrete slab. A satisfactory backfill is claimed as a result of this method.

Throughout the anthracite industry's history the problem of handling and disposing of refuse material has been one of major importance, according to Mr. Ingersoll and Mr. Muehlhof. They maintained that from the standpoint of economical future reclamation, the ideal method of disposing of refuse containing the finer sizes of coal is to deposit it in banks that are separate and apart from other breaker refuse. By this procedure the minimum quantity of material will be processed in future salvage operations to recover the No. 4 and No. 5 buckwheat sizes.

The principal methods of handling and disposing of fine-size refuse were cited: Gravity flow of solids in solution to a settling basin; use of pumping equipment to elevate the solids in solution to a point of discharge to a settling basin; use of mechanical equipment to remove the solids from solution and to convey or transport the dewatered solids to a refuse dump or bank.

•

Reemployment Of Veterans

A returning veteran who meets all the requirements of the Selective Service and Training Act for reemployment in his former job "has an absolute right of reinstatement in his former position or in a substantially similar position," according to a statement by Selective Service. The statement interprets the act as restoring the veteran to his old job if he meets the conditions of the act rather than merely restoring his job rights" in accordance with a system of seniority or other system of relative employee status existing in the employer's business.

The statement reiterates the position of Selective Service that the only conditions upon the veteran's right to reinstatement are those specifically enumerated in the act, as follows:

(1) That the veteran receive a certificate of satisfactory service.

(2) That he still be qualified to perform the duties of his position.

(3) That he make timely application for reinstatement.

(4) That the restoration be not unreasonable or impossible because of the employer's changed circumstances.

•

Shows Importance of Balancing Parts

The importance of balancing high-speed rotating parts of mechanical equipment was demonstrated by a film-talk delivered by Walter Zimmer at the May meeting of the Mining Electrical Group, held at West Frankfort, Ill. Mr. Zimmer is a representative of the Bear Mfg. Co., Rock Island, Ill., maker of dynamic balancing machines.

The talk called attention to the vibrations set up in unbalanced wheels, fans, cranks, armatures and other high-speed rotating parts, and their destructive effect on bearings, shafts and even track of a railroad. The remedy is scientific balancing. One machine for this purpose is made in numerous capacities, with dial indication of the angular position of the heavy side so that overweight may be removed from the correct spot or counterweight be added to the opposite side.

A machine from a local shop was used to demonstrate the technique of balancing coal-drill armatures. Such small armatures are balanced by applying one or two drops of solder to the band of the light side. The whole time required for such balancing is 10 to 15 minutes per armature.

•

Priorities Continue

Various limitation and control orders are being rescinded by the War Production Board, which is publicizing its plan for gradual modification of priorities and preference ratings. The ultimate goal is said to be a so-called two-band system for priorities—No. 1 for military requirements, No. 2 for operations directly related to war production and all else on a first come, first served basis. This, however, is still only in the blueprint stage. It is understood that it has been definitely decided that the P-56 order, providing priorities for maintenance and operation of the mines, will be continued approximately in its present form until Dec. 31 at least, possibly longer, and that L-269, pertaining to priorities for manufacturers of mining machinery, will be continued indefinitely.

MEETINGS

- **Big Sandy-Elkhorn Coal Operators Association: annual meeting, June 3, Ashland, Ky.**
- **Colorado and New Mexico Coal Operators' Association: annual meeting, June 20, 814 Boston Bldg., Denver, Colo.**
- **Mining Society of Nova Scotia: annual meeting, July 5 and 6, Kentville, N. S., Can.**

RUSSIA AND AMERICA

ALLIES—or else . . .

VICTORY in Europe was won only through the combined endeavor of the United Nations. Only through sustained joint effort can the fruits of that victory be reaped.

Without disparaging the truly heroic contributions of others, three of the Allies may fairly be credited with having made the major contributions to victory over the European Axis—the United Kingdom, Russia, and the United States. The close accord of these three nations is no less crucial to the accomplishment of the tasks that remain.

First of these is the war against Japan. It still requires winning. Even without any help from others, the United States could make good this victory, but the war's duration will be speeded by the marshaled effort of the United Nations.

Next, and not less important, is the task of establishing a basis for enduring peace. In this struggle our enemies are more formidable than any we have faced —national ambitions, prejudices, suspicions and distrusts, the staggering burden of tradition and debilitating cynicism born of past failure, the cleaving wedges of divergent languages, thought patterns, economic creeds and procedures—an array of difficulties as baffling as fog and as formidable as a deluge. They can be vanquished only by a continuance of the working accord between the United States, Russia, and Britain that was forged on the anvil of European conflict.

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This high appraisal of the decisive importance of the Big Three in determining the destiny of the United Nations organization, in no way depreciates the importance of the role to be played by France, by China, or the other freedom-seeking nations represented at San Francisco. All of us are committed to the building of a genuinely representative security organization in the conviction that by such means alone can we possibly achieve a just and lasting peace. But the strength of any international machinery will depend upon the validity of Russian-British-American cooperation. If these three are able to achieve substantial harmony of aim and procedure, a world organization that includes them can operate with effective coherence. If they pull apart, the United Nations will break up into competing and jealously hostile blocs.

This is inevitable because of the sheer weight of these three nations in the world's affairs. Between them they account for perhaps half of the world's income and from two-thirds to three-quarters of its industrial output. Once Japan has been crushed, they will control an overwhelming preponderance of the world's armed might. Each of them will wield military power on a scale quite beyond the power of any embryo security league to hold in check. Only if all three are resolved to keep the peace and to enforce it through the Security Council, can that body hope to accomplish its aim.

Although there is a tendency on both sides of the Atlantic to indulge somewhat recklessly in mutual criticism, the ties between Britain and America are too firm to be severed by any foreseeable strain. But that has not been true of our relations with Russia. Even while fighting a war in which our respective ways-of-life were at stake, the inestimable services of each to the other were rendered as friendly but independent associates rather than as fully trusted partners. Now again, as we approach the difficult and vitally important task of building a world organization and of devising a European peace, the task of our delegates is complicated by national attitudes under which each hopes for the best from the other, while fearing the worst.

But the stakes for us both—and for the rest of the world—are too high to be played for in a diplomatic poker game. Russia has no inhibitions in demanding what she wants, and our own vital interests must be stated and upheld with undeviating firmness. Yet we both must face the stark fact that few advantages that either nation might gain at the cost of dissipating the good will of our wartime association could be worth the price thus paid.

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The first steps toward establishing confidence lie in a frank recognition of what may contribute to the lack of it and in a definition of what can be done to restore it.

1. *Probably the greatest single area of reciprocal distrust between Russia and our own country is based on the fear of each that the other may try to interfere with its domestic, economic, and political affairs.* Each purports to see the beam of meddlesome intervention in the other's eye, while it ignores the mote in its own. Thus the Soviet Union remembers that we participated in the foreign military intervention at the time of her civil revolution, and afterwards lent our support to successive boycotts of her trade, of her gold, and of her credit needs. For our part, we remember the Soviet Union's doctrine, and

aggressive support, of revolutionary international communism.

We feel that Russia should find satisfactory evidence of our present willingness to have her develop her internal institutions as she will in the aid that we have given her during the war, and in the record of our good-neighbor policy as applied to Latin America. She, no doubt, resents our lingering suspicions in the face of her declared policy of 1941 to refrain from any attempt to influence the political or economic structure of foreign nations. Certainly, each of us will need the repeated reassurance that can come only through sustained performance by the other in the years ahead. Meanwhile, much will be gained if each will give to the other's good faith the benefit of the doubt, while it scrupulously guards its own conduct to avoid even the appearance of backsliding.

2. *A second zone of suspicion is created by those measures which each of us interprets as natural and necessary bulwarks of national security when they are our own, but as evidence of dangerously aggressive imperialism when taken by the other.* In our view, at least, such demands as we have voiced for island trusteeships or for other naval bases appear mildly conservative as compared with Soviet claims for annexation of territory and for a general orbit of influence, under governments friendly to her, throughout eastern Europe in particular.

There can be no easy solution to that problem. Bi-focal vision, by which one nation can look through a second lens ground to the prescription of another, seldom is achieved in international affairs. The success of the San Francisco Conference will provide a mechanism for international definition of principles and procedures which at least might relieve the inevitable strains. Most important will be the record of how each of us proceeds in our respective courses of action. Soviet performance thus far is highly unsatisfactory to us. While we have taken pains to clear our procedure with her, she has taken action in the Baltic, in Austria, and in Poland without even advance notice to us.

A major test of our ability to cooperate may be found in the Allied administration of conquered Germany. The proposed four-headed control of a four-way partitioned nation promises to be at best an extremely awkward mechanism of administration. At worst, it can result in continuous and dangerous bickering between the representatives of Britain, France, the United States, and Russia in the Berlin coordinating center, and in hopelessly divergent procedures in their several zones of administration. There will be a compelling need for all of us to exercise all of the wisdom and cooperative resolve that we possibly can muster.

3. *A third testing ground for the future of American-Soviet relationships will be defined by the course of Russia in our continuing war with Japan. We are not unmindful of the toll paid by the Soviet Union in its magnificent European war effort. But we still are locked in a desperate struggle with an enemy that exemplifies the Fascism which America and Russia equally denounce. And that war is being fought in an area where Russian interests are importantly at stake.*

Russia has an extraordinary opportunity to create good will by throwing her weight speedily and effectively on our side. There is no doubt but that the final Pacific settlement will generate problems comparable with those of the European peace, but it is equally certain that th continuation of the European comradeship in arms co do much to promote an enduring and confident postwa friendship.

4. *A fourth, and highly important, potential sourc of suspicion and irritation is the intellectual blockad that the Soviet Union has maintained against the fre flow of travel, intercourse, and exchange of ideas.* W can understand the genesis of this policy and the reason for its continuance while Russia entertained a constan fear of attack by powerful enemies. But the sustained perpetuation of such a quarantine by so strong a natio as the present U.S.S.R. could not be accepted as a protec tive measure. Inevitably it would generate suspicion tha it was rather an instrument of nationalistic isolation o even of contemplated aggression. A way-of-living, a arm's length, with a nation that maintains such intellec tual quarantines is possible; any whole-hearted partner ship of effort is quite impracticable.

5. *Trading between a free-enterprise nation and on that operates all foreign commerce as a governmen monopoly can give rise to many frictions.* That subject i too complicated for exposition here. Suffice it to say tha while difficult, it is not impossible to conduct such trad with mutual advantage. We are in a position to help Russia greatly with her program of industrial rehabilita tion and expansion at great saving of cost in terms of he current scale of living. In return, we must have assur ance that her government monopoly trading will b conducted for commercial rather than political ends, an that it will be used to encourage rather than to restric multilateral and non-discriminatory world trade.

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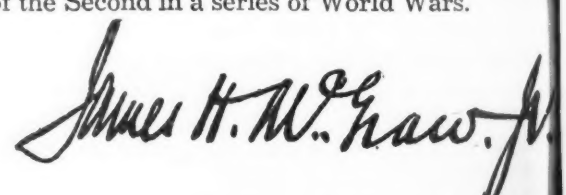
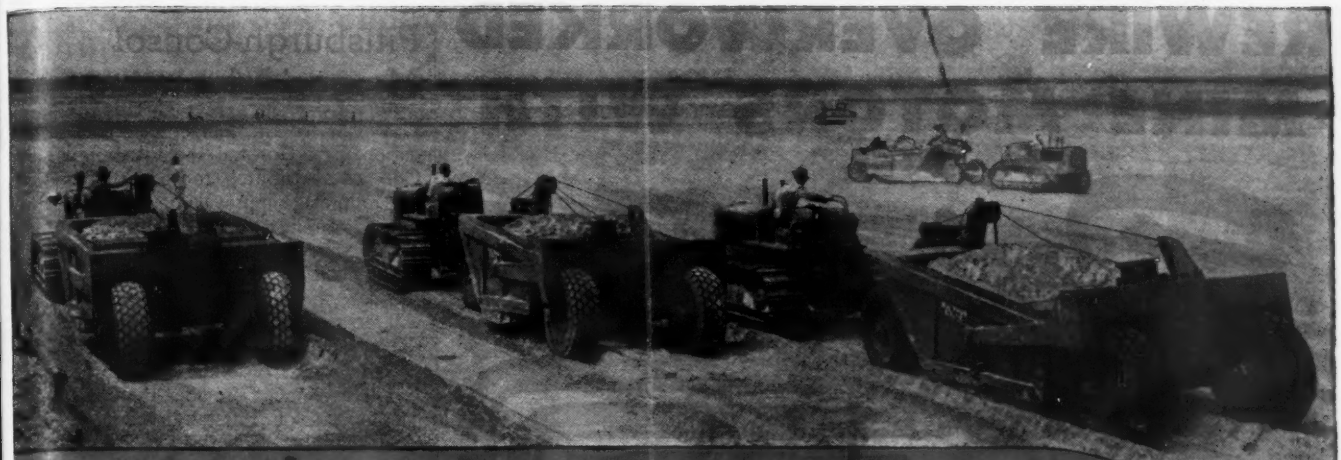
This is a representative list of the major areas in which misunderstanding and distrust may be gener ated, or allayed, in Russian-American relationships. No doubt, an equally honest list drawn by a citizen of the Soviet Union would be more heavily weighted by those features of our behavior which irritate and stimulate distrust on their side. If such a catalog were to be presented, it should receive our most searching and responsible consideration.

For it is of utmost importance that our two nations in concert with the other United Nations, learn how to get along in mutual confidence and respect. Our un derstanding of each other now is so imperfect that our negotiations are punctuated with continuous irri tations over *little issues.* This, inevitably, will con tinue until such matters are submerged in the general confidence that can be achieved only through satis factory settlement of the *big issues.* We must succeed in this, or the defeat of Japan will merely mark the end of the Second in a series of World Wars.



President, McGraw-Hill Publishing Co., Inc.



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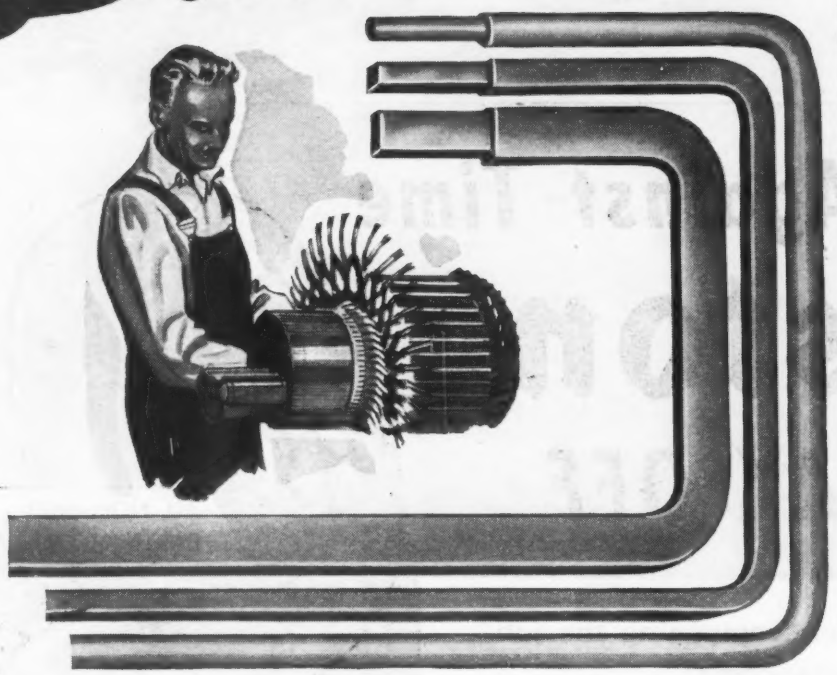

The selection of the proper magnet wire is very important today because motors in mines operate at peak load with little time to cool off. As a result the overworked motors build up intense heat, wiring insulation bakes out, and mining equipment must be repaired more frequently.

Next time rewire mine motors with Deltabeston Asbestos-insulated Magnet Wires and see the difference. Motors will stay on the job longer despite overloaded conditions. Unexpected repairs will be reduced to a minimum because Deltabeston is constructed to withstand the tough operating conditions encountered in the mines. If you use ready-made coils with class B insulation, specify Deltabeston-wound coils.

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GENERAL ELECTRIC

Pittsburgh-Consol Merger Advancing

A plan for the merger of the Consolidation Coal Co. and the Pittsburgh Coal Co. was distributed to stockholders May 22 following approval of the respective boards of directors, and special meetings of the shareholders of the two companies were called for July 24, 1945, to approve the agreement of merger. Consolidation will be merged into Pittsburgh Coal and the surviving corporation will be known as Pittsburgh Consolidation Coal Co.

The agreement provides that the principal officers of Pittsburgh Consolidation Coal shall be: Robert C. Hill, chairman of the board; Augustus K. Oliver, chairman of the finance committee; George H. Love, president, and J. B. Morrow, first vice president.

The plan of merger provides that a majority of each class of stock and of the two classes combined of Pittsburgh Coal are required to approve the merger. By reason of Delaware law, in which State Consolidation is incorporated, a two-thirds vote of approval is necessary by that organization. The board of directors of either company for any reason, which includes specifically the potential liability arising from the filing of certain objections by shareholders of either company, may abandon the entire plan even on a date subsequent to the meetings of the stockholders.

The initial board of directors of Pittsburgh Consolidation Coal Co. will consist of Arthur E. Braun, George H. Love, J. B. Morrow, Augustus K. Oliver, L. F. Rains, Alan M. Scaife, Arthur B. Van Buskirk, George W. Wyckoff and William P. Witherow, all of Pittsburgh; H. Donald Campbell, Robert C. Hill, Thomas I. Parkinson and Barton P. Turnbull, all of New York; Emory M. Ford, Detroit, and George M. Humphrey, Cleveland.

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Yellott to Direct Locomotive Research

Dr. John I. Yellott has been selected to direct immediately the new $1,100,000 program of the locomotive development committee of Bituminous Coal Research, Inc., for increasing the efficiency of American railway locomotives through the use of powdered coal, development of turbines and the application of newer steam power principles, it has been announced by the chairman of the committee, Roy B. White, president, Baltimore & Ohio R.R. Mr. Yellott, who will make his headquarters in Baltimore, is now director of the Institute of Gas Technology of the Illinois Institute of Technology and is the inventor of a new method of pulverizing coal through the direct action of moderate steam power.

This newly organized research program is sponsored by six railroads and three coal companies, including the B. & O., Chesapeake & Ohio, Louisville & Nashville, New York Central, Norfolk & Western and Pennsylvania R.R.; M. A. Hanna Co., Island Creek Co. and Sinclair Coal Co.

You need no new equipment to make this money-saving improvement:

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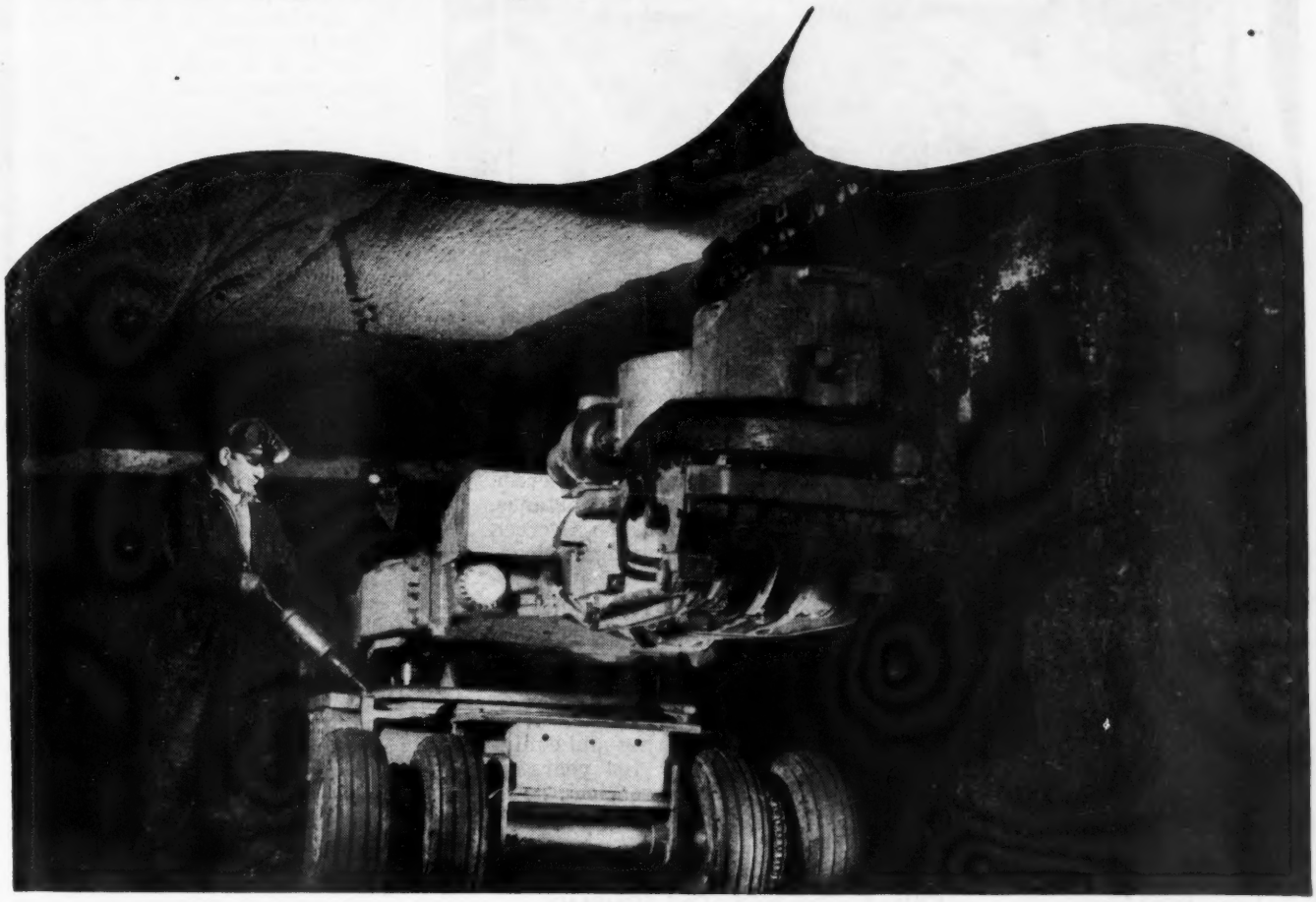

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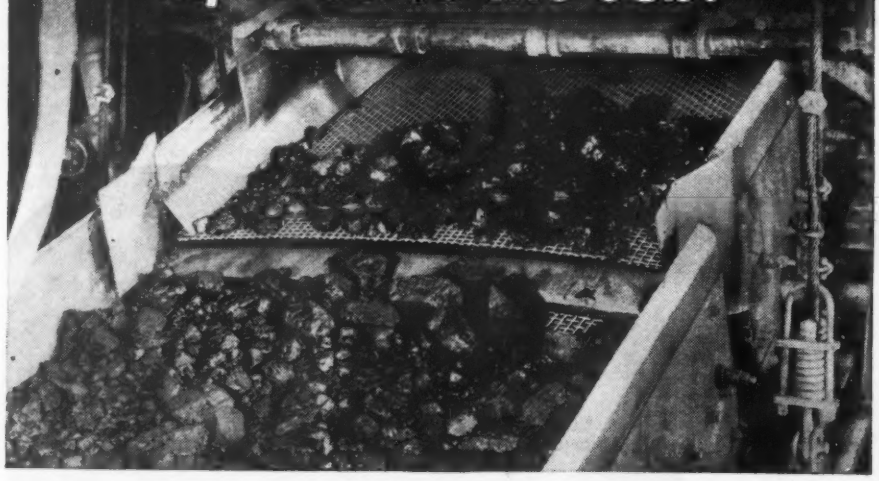
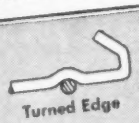
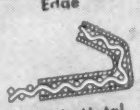


FOUR DIFFERENT FORMED EDGES



Turned Edge

Metal Reinforced Edge



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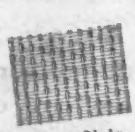
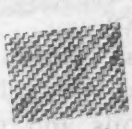
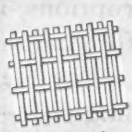


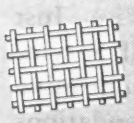
Dutch Plain Weave



"Jersey" Stranded



Rectangular Mesh



Square Mesh

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I.C.C. Hearings On Va.-Ky. Extensions

Hearings on applications of two railroads to build extensions into a coal-mining area near the Virginia-Kentucky line were held in mid-May at Louisville before Jerome K. Lytle, Interstate Commerce Commission examiner. Technical testimony was offered by the Chesapeake & Ohio and the Carolina, Clinchfield & Ohio R.R.'s to support their applications. The examiner said no decision would be reached for a month.

The C. & O. seeks to extend a line southwest from Jenkins, Ky., across Wise County, Virginia, at a cost of $2,277,000; the C. C. & O. wants to extend its line into the same general area from Fremont, Va., with an outlay of $1,998,683.

Track construction has begun by the Louisville & Nashville R.R. jointly with the Illinois Central R.R. on the West Kentucky Spur to develop coal lands near the L. & W. lines in Hopkins County, Kentucky. The project, which is to be completed before the year's end, will permit development of a West Kentucky Coal Co. tract of 6,000 acres containing an estimated 36,000,000 tons of No. 9 seam coal and the same quantity of No. 11 seam coal.

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Personal Notes

M. L. WORKMAN has been made general superintendent of Glen White, Helen, Long Branch, Stotesbury No. 8 and Stotesbury No. 11 mines of Koppers Coal Div., in West Virginia. He joined the company in 1923 as a rodman in the engineering department when the Wharton mine was first being surveyed. With the opening of the mine in 1924 he became an inside miner. Later he became a clerk in the company store and then was made payroll clerk. Successive promotions brought him to the superintendency of the Beards Fork and Powellton mines in 1932. By 1939 he was assistant division superintendent at Powellton, becoming superintendent at Stanaford in 1941.

M. L. Workman

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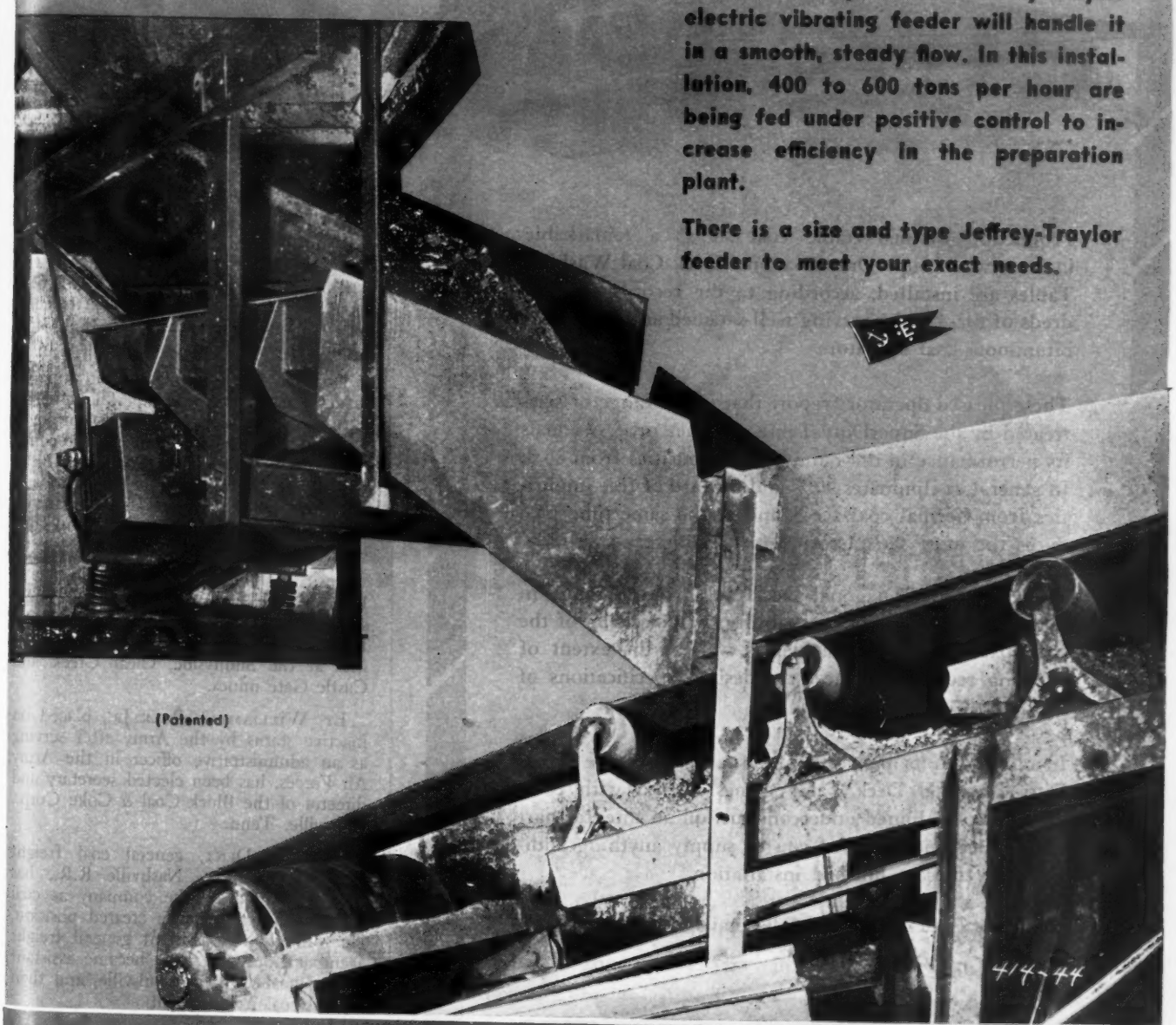

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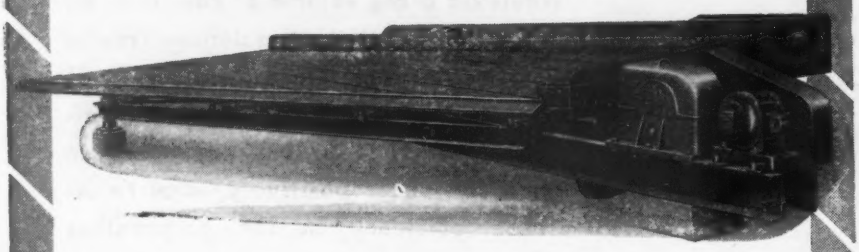

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The SuperDuty Diagonal Deck Table has a range in capacity, depending on washability characteristics of the coal, particle size and shape, as well as the extent of cleaning required to meet the desired specifications of product.

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J. H. Delaney

J. H. DELANEY, construction engineer for the Old Ben Coal Corp., has for his first assignment the installation of the synchronized equipment in the new No. 9 mine, West Frankfort, Ill. He formerly was mine superintendent for the Gulf, Mobile & Ohio R.R. Co. at Sparta, Ill.

DONALD N. SMITH, assistant superintendent of maintenance for The Hudson Coal Co., of which he was an employee for 22 years, has become maintenance engineer for the Koppers Coal Div., Pittsburgh, Pa. He was honored with a farewell party at the Hotel Casey, Scranton, May 29 by 180 of his coworkers in The Hudson company.

STANLEY C. HARVEY has resigned as Utah State coal-mine inspector to become safety supervisor of the Utah Fuel Co. In his new post he will direct safety activities at the Sunnyside, Clear Creek and Castle Gate mines.

LT. WILLIAM G. POLK JR., placed on inactive status by the Army after serving as an administrative officer in the Army Air Forces, has been elected secretary and director of the Block Coal & Coke Corp., Knoxville, Tenn.

JOHN K. DENT, general coal freight agent, Louisville & Nashville R.R., has been appointed by the company as coal traffic manager, a newly created position. He formerly was assistant general freight agent at Louisville, then became assistant general coal agent at Louisville, and then general coal freight agent.

G. S. JENKINS, formerly assistant general manager of the Consolidated Coal Co., St. Louis, operating mines in southern and central Illinois, has been made vice president in charge of operations and purchasing; R. L. DOUGLASS, formerly general sales agent, has been named vice president in charge of sales; NORVIN H. VAUGHN, formerly assistant general sales agent, now is general sales manager, and CARL E. REECE, formerly sales representative, has become assistant general sales manager.

H. A. DIERKS, formerly mining engineer for East Bear Ridge Colliery Co., under J. H. Pierce Management, has joined the

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Glen Alden Coal Co., Scranton, Pa., as mining engineer. He succeeds A. H. Lewis, who retired Jan. 1.

NORMAN W. LEE, owner of the Independent Operators' Sales Co., Arlington, Va., owning and controlling mines with half a million tons annual capacity, has been elected president and general manager of the Atlantic Smokeless Coal Co., Asco, W. Va. He also operates the Queen, Rowan and Hinkle mines, in West Virginia.

D. W. BUCHANAN, president, Old Ben Coal Corp., Chicago, has been elected a member of the board of directors of the Chicago & Eastern Illinois R.R., vice Chester L. Jones, resigned.

H. J. KELLEY, vice president in charge of operations, Dominion Coal Co., Sydney, N. S., has retired from active service after 21 years in that post. He has been reelected to the board of directors and will act as consultant.

T. S. MCLANDERS has been appointed executive assistant to the president of the Dominion Steel & Coal Corp., Sydney, N. S. In the company employ for the last 25 years, he has served the last seven years as general manager of coal sales.

LAURENCE O'TOOLE, director of the Crystal Block Coal & Coke Co., Huntington, W. Va., has been promoted to full colonel at headquarters, AAF Technical Training Command, St. Louis, Mo., by Brig. Gen. Aubrey Hornsby, commanding general. Colonel O'Toole, who is General Hornsby's chief of staff in charge of personnel, is a son of the late Colonel Edward O'Toole, who was general superintendent of the United States Coal & Coke Co., Gary, W. Va.

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Obituary

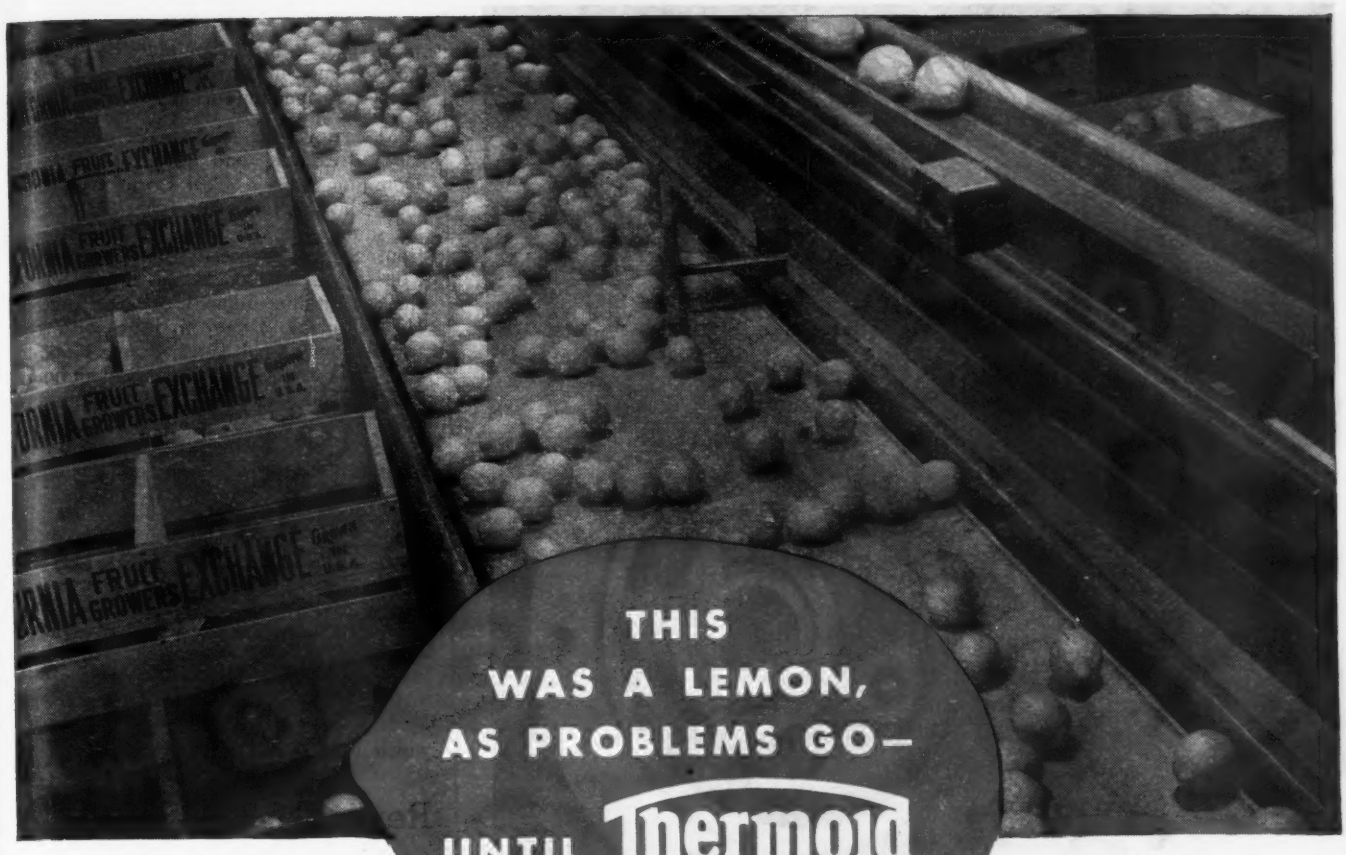
GEORGE HENRY SCHROER, 50, of the Schroer Coal Co., Cumberland, Ky., died May 12 in a Louisville hospital, the day after he was injured when a cable on a tipple broke, throwing him 40 ft. to the ground.

A. C. PURCELL, 63, owner of the Pekin mine at Equality, Ill., for the last eleven years, died April 27 at his home in Eldorado, Ill., after an illness of several weeks.

DR. SAMUEL BECK HERDMAN, 63, chief surgeon since 1932 of the Peabody Coal Co., Midland field, Taylorville, Ill., died May 18 from a cerebral hemorrhage.

ROSS I. DAVIS, 60, vice president of the Hillman Coal & Coke Co., Pittsburgh, died suddenly May 14 of a heart attack at his home, in Pittsburgh. Former operator of his own business, the Davis Coal & Coke Co., Pittsburgh, Mr. Davis had been with the Hillman firm since 1926.

HOMER G. TURNER, State College, Pa., associated with the Anthracite Institute since 1930 as a consultant and actively in charge of the Anthracite Equipment Corp.'s development and sales of Anthrafilt, died suddenly May 17 in Erie, Pa. Previous to his connection with the an-



While studying the citrus fruit packing industry, Dr. McClelland discovered that lemon sorters and graders were suffering unusual eye fatigue, which could be corrected by using grading belts of a special color. Dr. McClelland then specified a color which would give sufficient contrast to the color of the fruit for efficient sorting and yet provide a softer background, restful to the eyes of the graders.

Thermoid worked with Dr. McClelland. We found there were three things to be considered in making this new conveyor belting: (1) Making belts match the colors specified; (2) Making the belt's surface impervious to fruit mold—also a surface which would be easily sterilized; (3) Making a belt with a surface that would not rub off or discolor the fruit.

Thermoid is the only company licensed to manufacture Dr. McClelland's "Easy on the Eyes" Conveyor Belting. When war time restrictions are lifted, Thermoid will manufacture more of this belting.

This example of problem-solving ability was taken from our files to demonstrate that Thermoid engineering, research and manufacturing facilities—and the services of Thermoid's field representatives—are at your disposal in the solution of *your* industrial rubber problems.

DON'T PUT IT OFF
'TIL TOMORROW
Buy More War
Bonds Today!

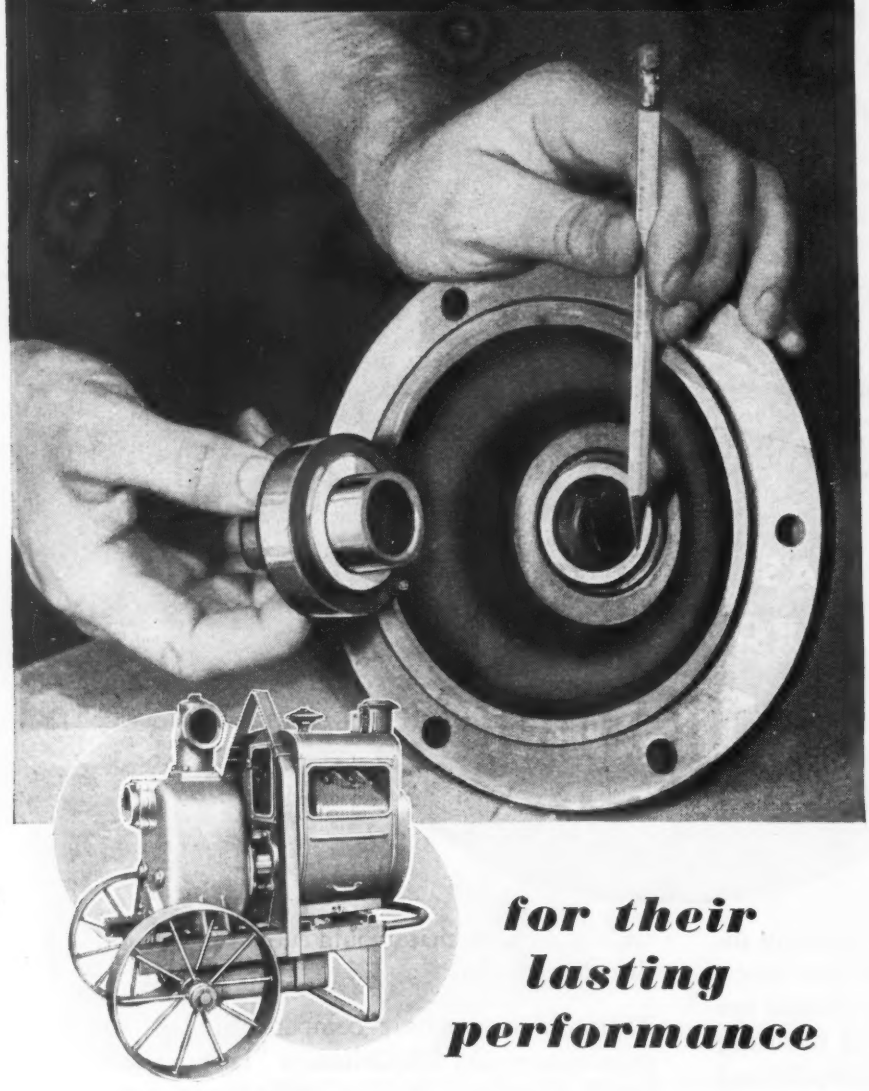
Thermoid Rubber

DIVISION OF THERMOID COMPANY
TRENTON, NEW JERSEY

"IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID"

THE THERMOID LINE INCLUDES: TRANSMISSION BELTING • F. H. P. AND MULTIPLE V-BELTS AND DRIVES • CONVEYOR BELTING • ELEVATOR BELTING • WRAPPED AND MOLDED HOSE • SHEET PACKINGS • INDUSTRIAL BRAKE LININGS AND FRICTION PRODUCTS • MOLDED HARD RUBBER AND PLASTIC PRODUCTS

Here's the Reason-



for their lasting performance

● The seal that keeps the water in and the air out consists of two wearing surface seal rings made of Tungsten Carbide and a grease container. One seal ring rotates on the shaft and is held in contact with the stationary ring by a stainless steel spring. This method of sealing is specially suited for high pressure work and when handling dirty water—the higher the pressure the tighter the seal. Dirty water cannot get into the grease and damage the shaft and bearings. Air is kept out of the pump so there's no loss of vacuum and high priming efficiency is maintained.

For details, see your local Carver distributor or write direct.

THE CARVER PUMP CO., Muscatine, Iowa

CARVER CENTRIFUGAL Certified PUMPS

thracite industry Mr. Turner was on the research staff at Lehigh University, where he became interested in the physical properties and non-fuel uses of anthracite.

MATTHEW W. McDONALD, 68, secretary, treasurer and director of the Dominion Steel & Coal Corp., Montreal, died May 18 following a heart attack at his summer home, Myra River, 10 miles from Sydney, N. S. Born in Sydney Mines, Mr. McDonald was a pioneer in the coal mining industry of Cape Breton. He began his career in 1891 with the International Coal Co. From 1906 to 1910 he was accountant of the Dominion Coal Co. at Glace Bay and Sydney, and from 1910 to 1922, chief clerk in the comptroller's department; became assistant comptroller in 1922 and comptroller in 1927.

•

Oldroyd Plant Rebuilt

Oldroyd mine, Pana, Ill., formerly known as Penwell mine, has completed construction of a new tipple and other buildings to replace structures that burned a few months ago. Buildings of the Springside mine, also in the Pana area, which burned, have not been replaced.

•

Report Unfounded

Through error, *Coal Age* carried on p. 162 of the May, 1945, issue, a report of the death of George S. Ward, secretary, Harlan County Coal Operators' Association, Harlan, Ky. Although received from a correspondent hitherto considered reliable, this report has proved to be entirely unfounded. Mr. Ward is alive and well and is actively engaged in his usual duties as the executive officer of the Harlan association. *Coal Age* takes this opportunity of correcting its error and expressing its sincere regrets to Mr. Ward and to his multitude of friends for this mistaken report of his passing. *Coal Age* also joins with these friends in wishing Mr. Ward many more years in which to continue his outstanding service to coal mining.

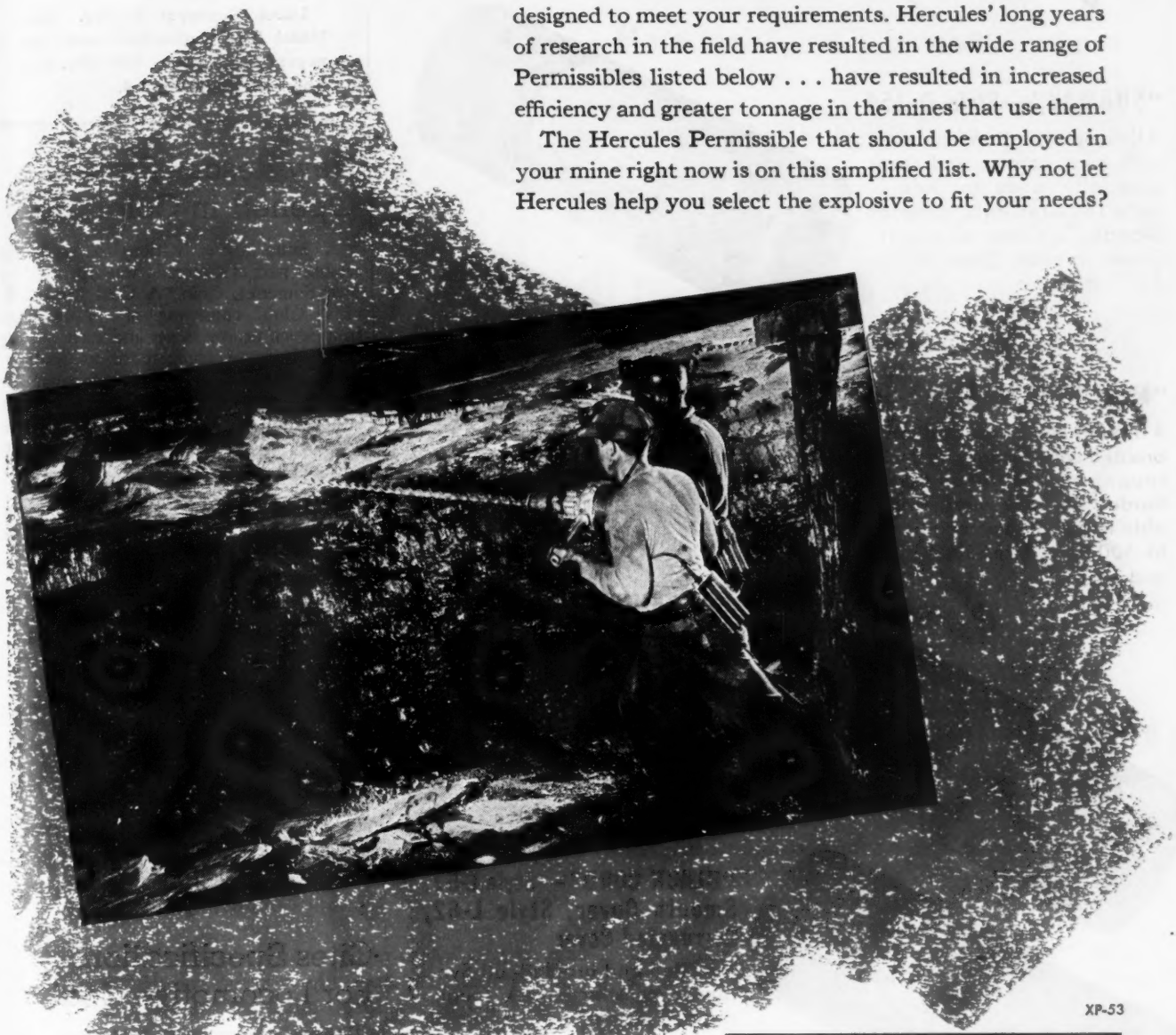
George S. Ward
Secretary, Harlan County Coal Operators' Association.

FOR MAXIMUM COAL PRODUCTION

There's a Hercules Permissible that fits your needs!

Whatever your particular problem or purpose in blasting . . . there's a Hercules Permissible Explosive specifically designed to meet your requirements. Hercules' long years of research in the field have resulted in the wide range of Permissibles listed below . . . have resulted in increased efficiency and greater tonnage in the mines that use them.

The Hercules Permissible that should be employed in your mine right now is on this simplified list. Why not let Hercules help you select the explosive to fit your needs?



XP-53

HERCULES PERMISSIBLES	
TYPE OF WORK	Approximate No. of 1¼" x 8" Cartridges per 100 lbs.
For Lump Coal	
Red H* C	276
Red H* D	316
Red H* F	356
For Rock or Fine Coal	
Red H* B	280
Collier* C	320
For Wet Work	
Hercogel* A	200
Hercogel* 2	240

HERCULES

EXPLOSIVES DEPARTMENT

HERCULES POWDER COMPANY
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Four Names That Mean Longer Safer AIR HOSE Service

"SUBWAY"—Style D-154

All-Synplastic construction, with tube, carcass and cover especially made for heavy-duty requirements. One of Goodall's oldest and best-known brands. Sizes ½" to 1¼", inclusive.

"MINE KING"—Style L-56

All-Synthetic, moulded and braided construction. Its thick, tough cover withstands the hardest abrasive wear. Available in continuous lengths up to 500 feet. Sizes: ½", ¾" and 1".

"OIL KING"—Style D-137

Wrapped construction, Synplastic tube. A heavy-duty hose that will stand up under the roughest handling. In smaller sizes it is particularly adapted to portable compressor work. Sizes: ½" to 1¼", inclusive.

"BLACK CORD"—Style L-57, Smooth Cover; Style L-62, Corrugated Cover

Moulded and braided, all-Synplastic construction. A tough, durable hose that will take real punishment, below ground or above. Sizes: ½", ¾" and 1".

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GOODALL RUBBER CO. OF CALIF.
Factory — Trenton, N. J.

GOODALL RUBBER CO. OF TEXAS
Established 1870

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, as follows:

J. V. Hammond Co.—Dry-cell type 3-volt single-shot blasting unit with short-circuiting-type firing plug; Approval 1226; April 2.

LaDel Conveyor & Mfg. Co.—Model U-17 shaker-type room conveyor; 10-hp. motor; 500 volts, d.c.; Approval 530A; April 4.

New Rescue Station Opened in Colorado

A mine rescue station to serve the western part of Colorado was opened May 3 at Somerset, Colo. A Coal Mine Officials' Club, consisting of 35 members from seven nearby mines and each holding a certificate of competence as shotfirer, fireboss, assistant foreman, foreman or superintendent, organized the station. It is housed in a building furnished by the Calumet Fuel Co. and is financed by an assessment of $2,500 based on the 1943 production of each mine.

The station is fully equipped and can send out a six-man team completely outfitted. The training schedule calls for weekly use of the equipment, which is expected to keep the paraphernalia in readiness for emergency use. A special assessment based on the previous year's production for each mine will be levied to take care of current operating expenses.

In charge of the station is the following committee: Gomer Reese, mine foreman, Calumet Fuel Co.'s Somerset mine (chairman), elected for a three-year term; Abel Audin, mine foreman, Hawks Nest mine, Somerset, C. E. Audin & Sons, elected for a two-year term; Harry Downing, fireboss, Juanita Coal & Coke Co.'s King mine, elected for one year.

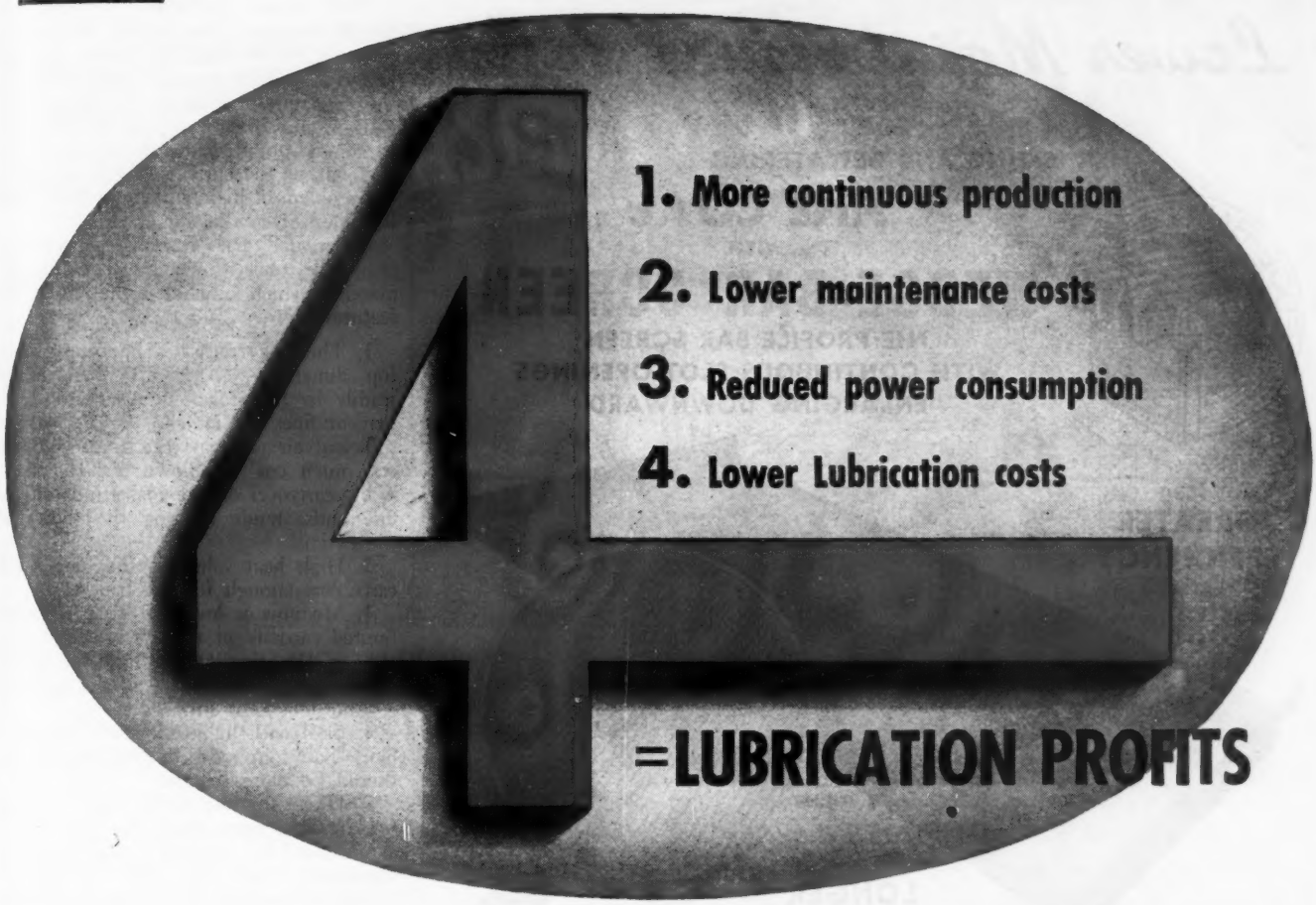
•

Cites Specifications For Locomotive Coal

Railroad locomotive coal was discussed before the April meeting of Illinois Coal Preparation Engineers and Chemists by Allan O. Geertz, fuel engineer, coal traffic department, Pennsylvania R.R. The chief points analyzed were the problem of burning enough coal in the limited firebox of a modern locomotive to put heavy trains over the road at high speed and the qualities desirable in coal to enable trains to get in on schedule time.

The modern electric power plant, it was cited, burns coal at a rate up to 46 lb. per square foot of grate surface per hour whereas the modern locomotive must do the miracle of burning it at a rate of 240 lb. per square foot of grate per hour. This is because of the limited space into which this portable power plant must be compressed. For example, a certain locomotive must burn 17,000 lb. of coal per hour

Your 4 Best Oil "Specifications"



Socony-Vacuum's 4-Factor Story

No matter what machines you operate—you'll find that your best specifications for oil or grease are *ultimate results*.

You're not interested in the oil or grease as such. You're after continuous production, uninterrupted by machine failure. You want lower maintenance costs from maximum machine protection, reduced power consumption from lower frictional losses and, finally, you want lower lubrication costs.

In short, what you want are the 4 factors of Socony-Vacuum Correct Lubrication—the 4 factors that add up to lubrication profits for your plant.

You can get these 4 factors now with Socony-Vacuum's *complete lubrication program* for your plant. For this program not only means the best quality lubricants for specific needs, but also includes skilled engineering counsel for scientific application, latest storage and handling methods, charts, controls and even progress reports of benefits obtained.

See your Socony-Vacuum representative and *specify* the 4-factor story for your lubrication dollars.

GARGOYLE Lubricants

Call in SOCONY-VACUUM *for Correct Lubrication*

SOCONY-VACUUM OIL COMPANY, INC., Standard Oil of N. Y. Division • White Star Division • Lubrite Division • Chicago Division
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Increase Production and Lower Maintenance Costs

IN

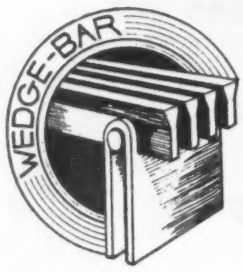
SIZING AND DEWATERING

FINE COAL

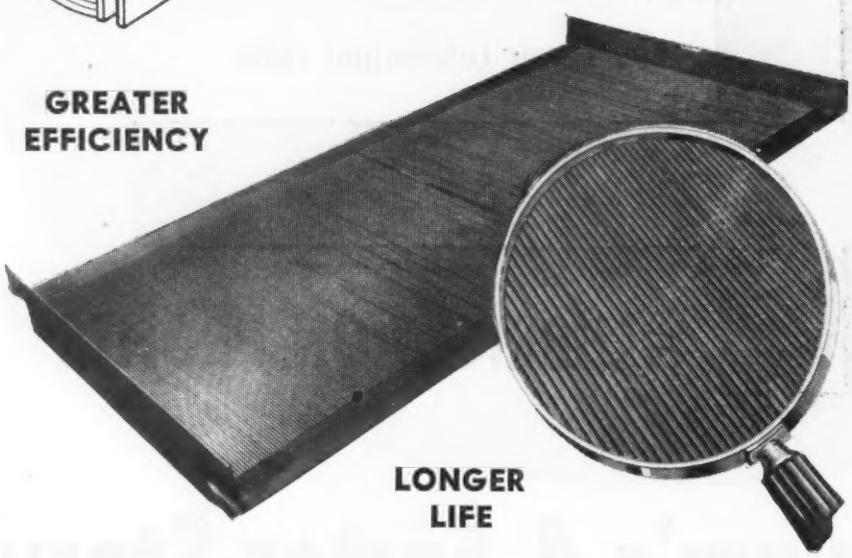
WITH

WEDGE-BAR SCREEN

THE PROFILE BAR SCREEN
WITH CONTINUOUS SLOT OPENINGS
ENLARGING DOWNWARD



GREATER EFFICIENCY



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WEDGE-BAR means continuous slots. No cross wires, loops or non-perforated areas. "Downward enlargement" draws moisture and undersize from screen surface. U-Holder supports mean maximum carrying capacity and rigidity, minimum weight.

WEDGE-BAR Sections are specially designed and fabricated to do your job and fit your equipment for the most efficient screen performance and longest life. Our data sheets are available for your convenience in supplying data we need to make our recommendations—without obligation on your part. Write us.

SHAKER JACKETS • VIBRATING SCREEN PANELS
CHUTES • CONVEYORS • DRYERS

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EXCLUSIVE **WANTED** TERRITORY

on a grate area approximating 70 sq.ft. and create a draft of 25 in. at the front end of the boiler to pull 2,400 lb. of air per hour through each square foot of grate area.

This creates problems of design to handle the coal from tender to furnace, to maintain an even fire with necessary air space, to carry the ashes and cinders to the next dumping point, to protect flue ends from abrasion by cinders at high speed and to prevent too serious loss of coal out of the stack. Added to that is the problem of maintaining an enormously high rate of combustion.

Experience has formulated specifications for a fuel to meet these exacting demands, which include the following features:

1. The size consist is important; 7-in. top dimension, so it may be handled readily by the stoker; a maximum of 30 percent fines (1¼-in. and under), so that sufficient air will pass the grates and not too much coal be blown out the stack. A big carryover of fine coal grinds off the flue ends, tends to clog the flues and wastes coal.
2. High heat value, so the tender will carry coal enough for the trip.
3. Medium or low ash content, so the limited capacity of the ash pan will hold out to the next cinder-discharge point. Inherent ash in the coal is all right but gob must be kept out.
4. Coal with high-fusion ash is preferable. Softening and fusion temperatures should be close together.
5. High swelling coal—that is, high for the field from which the coal comes, as measured by standard swelling tests—is important. Outcrop coal has lost its faculty of swelling and is undesirable for locomotive fuel.

Glen Alden Valuation For Taxes Reduced

Glen Alden Coal Co. was unanimously granted on May 7 its request for a reduction of $2,264,599 in its city tax assessment of $8,835,978 by members of the Wilkes-Barre City Council, sitting as a Board of Revision of Taxes and Appeals. The action followed a cut of $6,500,000 allowed by the Luzerne County commissioners in the company's county assessment. The total saving to the company in city, school and county taxes will be $126,814 annually.

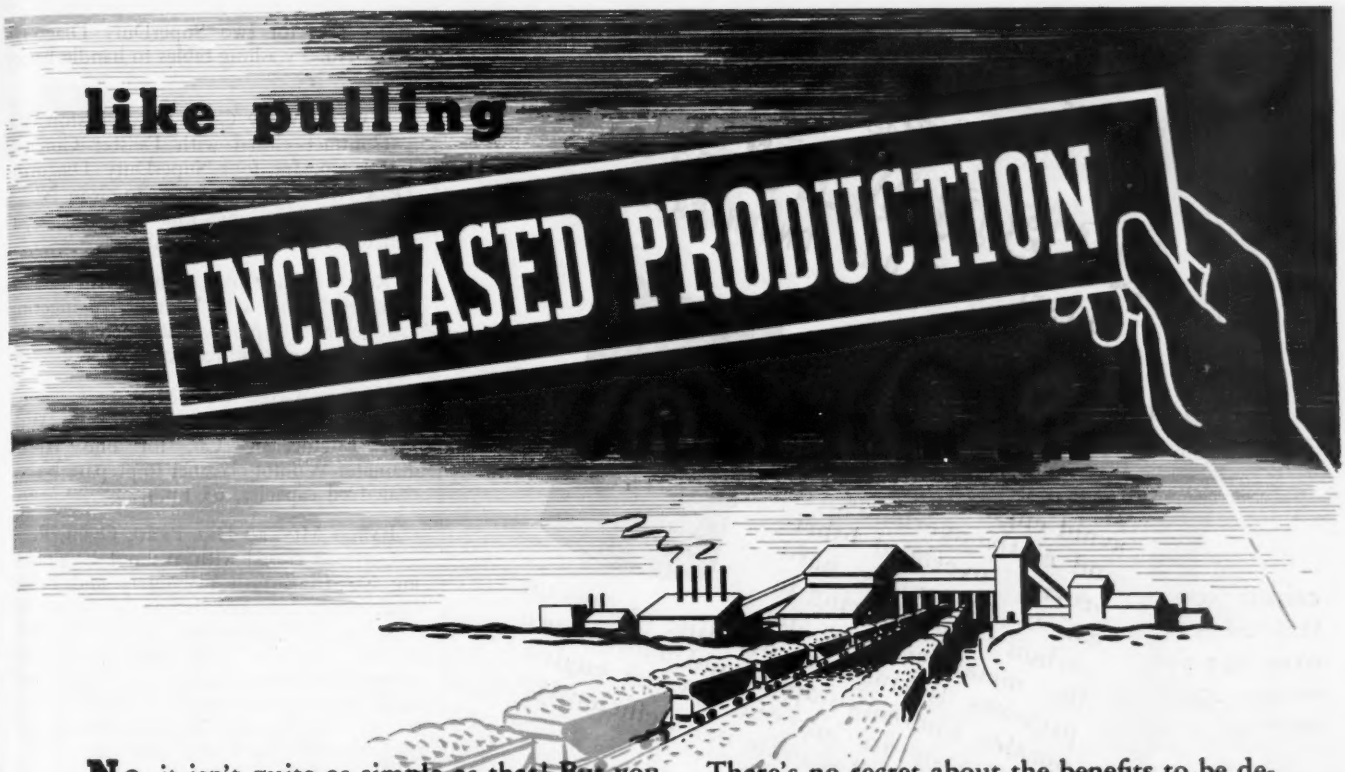
Preparation Facilities

RUSSELL MINING CO., Spring Brook Breaker, Moosic, Pa.—Contract closed with Menzies Separator Co. for one 2-ft. Menzies cone to clean barley size coal; feed capacity, 6 t.p.h.

PEKIN MINING CO., Pekin, Ill.—Contract closed with Deister Concentrator Co. for two SuperDuty Diagonal-Deck washing tables to treat 0x1¼-in. bituminous coal.

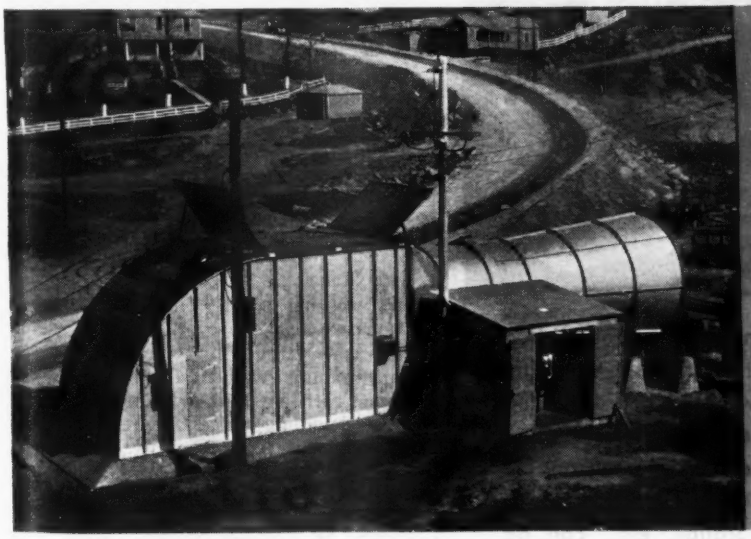
T. F. STEELE COAL CO., Junedale, Pa.—Contract closed with Deister Concen-

like pulling INCREASED PRODUCTION



No, it isn't quite as simple as that! But you *can* "use air" to increase production in your mine . . . pure, fresh air, efficiently circulated throughout your mine by La-Del Axial Flow Fans. Effective ventilation creates better working conditions by eliminating noxious fumes and smoke, especially in confined quarters where foul air is most prevalent.

There's no secret about the benefits to be derived from safer, improved working conditions. Increased efficiency is only natural when men work in safe, well-ventilated mines. Let La-Del engineers analyze your mine ventilation problems and prove to you that a La-Del Axial Flow Fan will not only *increase production,* but *lower operating costs as well.*



La-Del Troller 8 foot diameter, high pressure mine ventilation fan, attached to shaft.

LA-DEL MINING EQUIPMENT

Belt Conveyors

Shaker Conveyors • Chain Conveyors

Elevating Heads

Pit Car Loaders • Mobile Loading Machines

La-Del Troller Mine Ventilating Fans and Blowers

And La-Del Experienced Engineering Counsel . . . Before and After Installation.

MATERIAL HANDLING LA-DEL MINE VENTILATION

KEEP BUYING — AND KEEP — WAR BONDS!

ARMY E NAVY

LA-DEL CONVEYOR AND MANUFACTURING CO.

New Philadelphia, Ohio

COMPLETE LINE OF UNDERGROUND CONVEYORS FOR LOW COST OPERATION

AVOID ENGINE BREAKDOWNS

Use

GIBRALTAR

DIESEL FUEL OIL CONCENTRATE

Four ounces of Gibraltar Diesel Fuel Oil Concentrate added to ten gallons of Diesel fuel oil will avoid engine breakdowns and costly overhauls. It provides overhead lubrication, preventing hard carbon from adhering to the metal surfaces and prevents sticking and corroding of injector nozzles. Fuel consumption and maintenance costs are lowered and the engine will operate more efficiently.

CERTAIN CHOICE TERRITORIES ARE OPEN FOR PROGRESSIVE JOBBERS. WRITE FOR DETAILS.

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Standard and Special Mine Track Work

For more than sixty years Weir Kilby has been manufacturing good quality trackwork for Railways, Mines, and Industrial plants. As rolling stock and other apparatus have become heavier we have improved and strengthened our product to meet these new service demands. Our many customers are pleased with our good deliveries, reasonable prices and superior product. We will be glad to work with you. Many items, such as TITAN Frogs, Switches, Switch Stands, etc., can be shipped from stock. Others will be made up promptly.

CATALOG "H" comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy promptly.

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CINCINNATI 12, O. BIRMINGHAM 7, ALA.

trator Co. for two SuperDuty Diagonal-Deck No. 7 washing tables to handle barley coal.

VALLEY VIEW COAL CO., Pittston, Pa. —Contract closed with Deister Concentrator Co. for four SuperDuty Diagonal-Deck No. 7 washing tables to clean No. 4 buckwheat; also one four-way split Concenco revolving feed distributor.

ROSINI BROTHERS, Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for one Type D Wilmot Simplex jig to prepare nut coal; feed capacity, 20 t.p.h.

HUDSON COAL CO., Marvine Colliery, Scranton, Pa.—Contract closed with Wilmot Engineering Co. for one 16-ft.-diameter Wilmot classifier to prepare No. 5 coal; feed capacity, 65 t.p.h.

BANCO MINERO DEL PERU, Oyon, Peru —Contract closed with Wilmot Engineering Co. to furnish machinery and other equipment for installation of fine-coal cleaning plant; elevation, 16,000 ft.; machinery includes feed conveyor, sizing screens, dewatering shaker, pumps and electrical equipment; cleaning equipment will be one 7-ft.-diameter Wilmot Hydrotator, feed capacity 50 t.p.h.; and one 12-ft.-diameter Wilmot classifier, feed capacity 40 t.p.h.

COAL RAIN COAL CO., Coal Rain Breaker, Junedale, Pa.—Contract closed with Menzies Separator Co. for one 2-ft. Menzies cone to clean rice coal; feed capacity, 6 t.p.h.; also one 2 ft. Menzies cone to clean barley coal.

C. H. MEAD COAL CO., East Gulf, W. Va.—Contract closed with Kanawha Mfg. Co. for washing plant to handle 5x¼-in. coal at rate of 225 t.p.h.; consists of Jeffrey 84-in. two-compartment five-cell Baum jig, dewatering and classifying shaker screens, Allis-Chalmers Ripl-flo vibrator for fine-coal screening and final dewatering, concrete settling tank, provision for cracking lump down and recirculating over main shaker screens, and system for crushing bone and middlings and recirculating through jig.

WINDING GULF COLLIERIES, Riffe Branch (W. Va.) Mine—Contract closed with Kanawha Mfg. Co. for preparation and washing plant consisting of 185-ft. mine-run belt conveyor, raw-coal scraper conveyor, Jeffrey two-compartment diaphragm unit washer, dewatering shaker screens, settling tank with necessary conveyors handling sludge and refuse and for reassembling; plant capacity, 250 t.p.h.; washer capacity, 90 t.p.h. of 3x⅜-in. coal.

WYATT COAL CO., Laing No. 1 Mine, Laing, W. Va.—Contract closed with Kanawha Mfg. Co. for crushing plant permitting all sizes above slack to be crushed and recirculated over main shaker screens; capacity, 250 t.p.h.

•

Utah Blast Kills 23

An explosion at 3:15 p.m. May 9 two miles inside the Sunnyside No. 1 mine of the Utah Fuel Co., Sunnyside, Utah, snuffed out the lives of 23 miners and

Sure-footed!

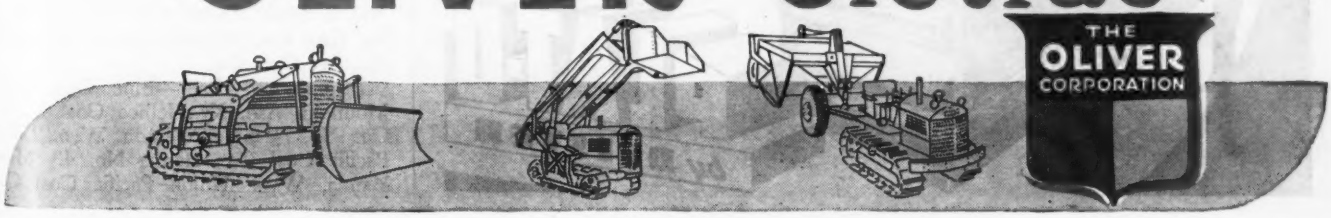
● Downhill or up . . . turns or straightaway, Oliver "Cletrac" crawler tractors have a sure-footed grip. Even when taking a heavy load downhill, they don't zigzag. Power is never disconnected from either track . . . both tracks keep working all the time to assure perfect control, even on turns.

This sure-footed grip, which assures greater safety on hills and turns, is found only on Oliver "Cletracs." For only Oliver "Cletrac" gives you *controlled differential steering* . . . the exclusive feature that eliminates "declutching" or "braking" on turns . . . that enables Oliver "Cletracs" with a heavy load to steer the same going downhill as up. There is no need for the operator to "cross over" on the controls and steer in the opposite direction as is necessary on the ordinary tractor.

These sure-footed tractors are unusually accessible, making maintenance a simple task. They are ruggedly built for long life and greater resistance to the shocks, strains and twists of tractor service.

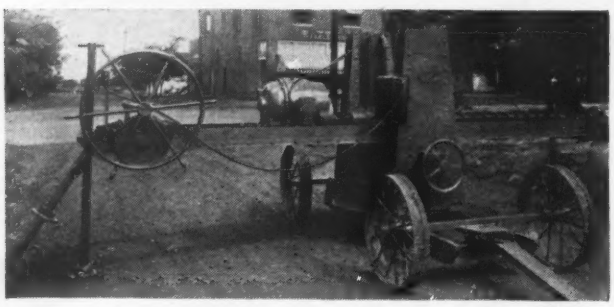
Substantial numbers of Oliver "Cletrac" tractors are now being released for essential use. Your Cletrac dealer will gladly assist you in making application for a new tractor. • **The OLIVER Corporation,** Industrial Division: 19300 Euclid Avenue, Cleveland, Ohio.

OLIVER - Cletrac



"UNITED" Horizontal DRILL

★ The United Horizontal Drill Frame is movable up and down in a range of 4 ft. It also can be set at an angle up or down. The drill frame is mounted on a turn table which allows the frame to turn 360°. It is powered by an electric motor or gasoline engine. Mounted on steel wheels or rubber tires. This equipment again emphasizes the ability of our engineers to design for the users' best advantage.



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coal pinning machines
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ENGINEERS • FOUNDERS • MANUFACTURERS

PITTSBURG *Trailers, and Coal Mine Equipment* KANSAS

A STANDOUT For Stamina

On the heavy-duty coal grading jobs . . . the jobs where the load keeps coming . . . the jobs where the screen must take a pounding hour after hour . . . the Plat-O Vibrating Screen has proved itself a *standout for stamina.*

In the Plat-O Screen, the emphasis is on rugged durability at every point of design and construction. Heavy steel framework and sides are of all-welded construction. Bearings, drive shaft and other parts which must take wear are oversize. There are no eccentrics and only two bearings (SKF Spherical Roller).

That's why, for the *punishing* jobs, more and more coal mine operators are turning to Plat-O for *better sizing—cheaper.* That's also why it will pay you to ask Deister Machine Company engineers for the whole story on efficient and lower cost grading with Plat-O Vibrating Screens. Write today for complete information.

DEISTER MACHINE CO.
Fort Wayne 4, Ind.

severely injured seven others. The blast, which occurred in No. 3 left off the second dip, was of such force that flames burst through the tunnel, came out of the ventilating fans at the surface workings and damaged the mine tipple, more than two miles from its source. By the following evening 23 bodies had been removed from the mine and two more were still missing.

Carl Westerberg, project manager for the Sunnyside operations of the Utah Fuel Co., said: "The accident apparently was caused by a gas explosion in the Third left district, where the blast seems to have been most severe."

•

Senate Committee Rejects MVA Bill

The Senate Commerce Committee voted May 7 against the Murray Bill (S. 555) proposing the establishment of a Missouri Valley Authority. The measure, which would set up a three-member authority, patterned after the Tennessee Valley Authority, to develop flood control, navigation and electric power in the Missouri River Basin, was rejected on all phases. The bill was scheduled to be sent to the Irrigation and Reclamation Committee for consideration.

•

Winners Named For Safety Trophies

Working nearly 6½ million man-hours in 1944 without a disabling injury of any kind, the employees and officials of 84 mines and quarries in the United States have been cited for outstanding safety records by Dr. R. R. Sayers, Director of the U. S. Bureau of Mines, who announced May 28 the six winners of the "Sentinels of Safety" trophies in the 20th annual national safety competition conducted by the Bureau.

The winner among underground bituminous coal mines was "D" mine of the Union Pacific Coal Co., Superior, Wyo., which worked 81,650 man-hours without any lost-time accidents. Among underground anthracite mines the winner was the Miles Slope mine of the Hudson Coal Co., Dickson City, Pa., which worked 229,496 man-hours with only three lost-time injuries causing twelve days of disability and an extremely low accident-severity rate.

Certificates of honorable mention for outstanding safety records were awarded the following:

Anthracite Mines—Oregon Slope mine, Pittston, Pa., operated by the Morgan Coal Co.; Midvalley mine, Wilburton, Pa., Hazle Brook Coal Co.; Eddie and Joe No. 2 mine, Forest City, Pa., Eddie & Joe Coal Co.; Olyphant mine, Olyphant, Pa., Ace Coal Co.

Bituminous Mines—Blue Gem mine, Mountain Ash, Ky., Jellico Coal Mining Co.; No. 7½ mine, Winton, Wyo., Union Pacific Coal Co.; Hanna No. 4A Mine, Hanna, Wyo., Union Pacific Coal Co.;

"...now use Ring-Free exclusively..."

Excerpts from letter of—
N. G. HILL
N. G. Hill & Co., Contractors
Phoenix, Arizona

"...four years ago, after we purchased a fleet of Chevrolet trucks for a road construction job on Highway 77, we were induced to try Ring-Free Motor Oil.

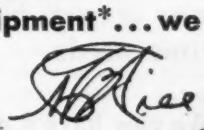
...the test was a tough one due to weather conditions...heavy snow and rain in winter...heat and dust storms in summer.

...during all this time we did not pull a head or pan in any of the trucks except one damaged by striking a huge boulder.

...after the job was completed we removed heads and pans on all motors which had from 50,000 to 60,000 motor miles.

...all compression rings were free...all drain holes in oil rings open...also drain back holes in pistons completely open and no carbon on the under side of the pistons. Cylinder heads and valves were also clean and all valve stems free in the guides. Engine pans and oil pump screens were cleaner than we expected...all bearings were in good shape.

...we now use Ring-Free exclusively in all our equipment*...we recommend Ring-Free Motor Oil to other contractors."



* *36 Trucks—Fords, Chevrolets, Internationals; 6 A.C. Tractors, Diesel powered. 1 D-8 Caterpillar; 3 Graders—2 powered by International and 1 by Caterpillar motor; 1 International T. D-40 Tractor; 1 Lorraine 40—¾ cubic yard power shovel; 3 Light Plants powered by Kohler motors; 1 Gravel plant powered by 8800 Caterpillar Diesel. Also numerous pick-ups and station wagons.*

Operators of all types of equipment report lower-cost, more efficient performance with Ring-Free Motor Oil. Find out how Ring-Free can help lick your toughest lubrication problems... Phone or write the nearest Macmillan office.

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Elcomb mine, Harlan, Ky., Elcomb Coal Co.

Among open-cut mines, the Forsyth-Carterville bituminous mine of the Forsyth-Carterville Coal Co., Carterville, Ill., operated during 1944 without a disabling injury.

The 84 accident-free operations were among 373 mines and quarries in 36 States participating in the competition last year, Dr. Sayers stated, adding that this remarkable accident record was achieved despite wartime handicaps such as greatly increased production, loss of skilled workers to the armed forces and other industries, and inability to replace badly worn machinery.

"Sentinels of Safety" trophies, provided each year for this contest by the *Explosives Engineer* magazine, were awarded to the top-ranking mines and quarries in six classifications, and certificates of honorable mention were awarded to 69 mines and quarries for working 30,000 or more man-hours without an accident or for ranking among the first five in each group.

•

20,000 Trees Planted On Hudson Strip Land

Hudson Coal Co. has just completed planting about 20 acres of stripping soil bank near Wilkes-Barre, Pa., with about 20,000 two-year-old seedlings. They are largely white pine, red pine, Norway spruce and white spruce, with a few black locust. The new planting is alongside the main highway entering Wilkes-Barre from the east (Route No. 315) on both sides of a four-lane road just above the point where this road enters the built-up section of the city.

Done with colliery labor, the number of trees planted varied with the character of the ground from 49 to 30 trees per man-hour. The total cost of purchasing and planting the trees was about $40 per thousand trees, or $40 per acre.

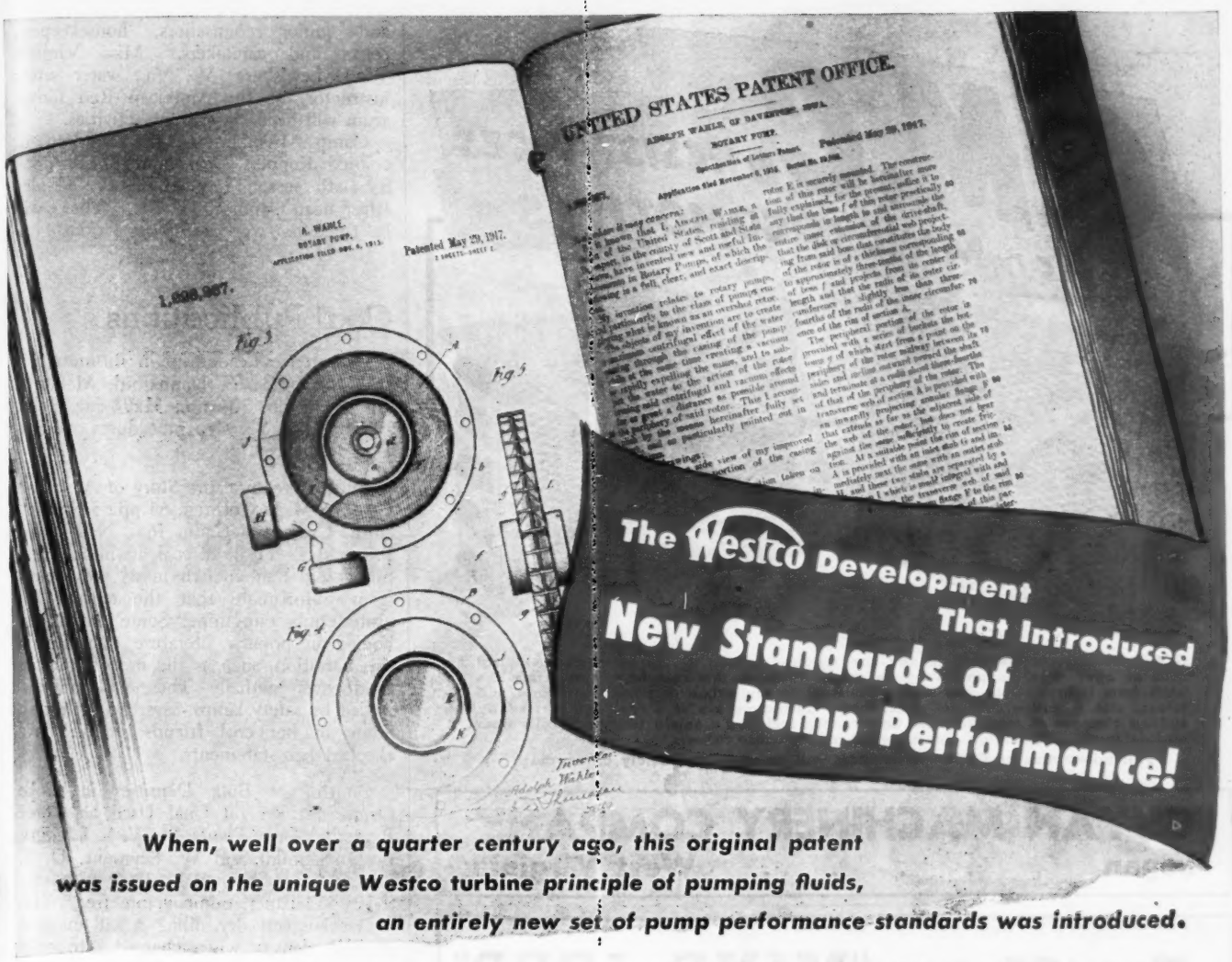
•

Koppers to Hold Tenth Summer Camps

The tenth annual season of summer camps maintained by Koppers Coal Div. for the children of its mine workers opens June 26 at Camp Thomas E. Lightfoot, a 76-acre private reservation area on the Big Bend of the Greenbrier River near Hinton, W. Va. There will be four two-week camping periods ending Aug. 24. Registrations began May 16 at the Koppers Coal mine offices in West Virginia, Pennsylvania and Kentucky.

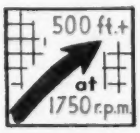
Because there usually are more applications than the 800-per-season capacity of the camp, Mr. Lightfoot, director of welfare for the company, states that registrations must be limited to two from each family, between the ages of 8½ and 14 years. The children pay $7 each for the two-week period, including private bus transportation from their homes to the camp and return.

Virgil M. Beckett, principal of the Hillsboro (W. Va.) graded school, will return again this year as camp director to head the organization of nearly 40 senior



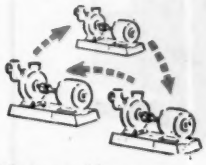
When, well over a quarter century ago, this original patent was issued on the unique Westco turbine principle of pumping fluids, an entirely new set of pump performance standards was introduced.

And so fundamental and far-reaching are the advantages provided by this *turbine* pumping principle that today's Fairbanks-Morse Westco Pump is still unmatched in its field for unusual adaptability, high operating efficiency, trouble-free economy and simple maintenance. For example...



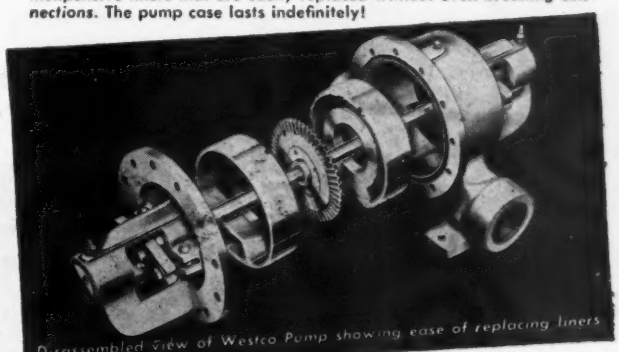
▸ The Fairbanks-Morse Westco *turbine* pump will handle heads of even 500 ft and higher in single stage, at an operating speed of only 1750 RPM. This relatively slow speed lengthens pump life and eliminates need for special motors or drives!

▸ The Fairbanks-Morse Westco *turbine* pump handles widely varying heads—with only a small change in capacity. This assures maximum adaptability to different types of jobs *with the same pump!*



▸ The Fairbanks-Morse Westco *turbine* pump, due to regenerative action of its turbine blades, develops pressures frequently requiring 2 or more stages of centrifugal pumps. One pump instead of two cuts costs, cuts upkeep!

▸ The Fairbanks-Morse Westco *turbine* pump is unusually simple to maintain. There is just one moving part... and wear is taken by 2 inexpensive liners that are easily replaced *without even breaking connections.* The pump case lasts indefinitely!



Disassembled View of Westco Pump showing ease of replacing liners

These are just a few of *many* Westco advantages. Before you buy *any* pump for small or medium-gallonage applications get the full story on Westco savings. Your Fairbanks-Morse or Westco dealer will gladly supply details—or write direct. Fairbanks-Morse & Co., Chicago 5, Illinois.

Write for Bulletin H-65

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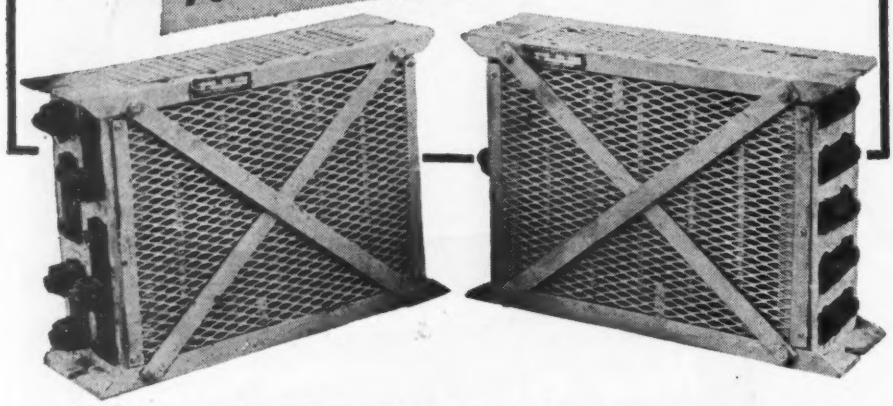

G.M.C. Resistances are built in any size required. Their design incorporates helical coils of alloy wire, supported by an external frame, this completely protecting the units from injury. Coils are highly resistant to the action of mine water and mill fumes; and vibration does not affect them. Insulators are of a type not harmed by sudden changes of temperature. Construction includes a shield to protect coils from outside injury and foreign objects which might cause "shorts".

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and junior counsellors, housekeepers, cooks and caretakers. Miss Virginia West, Lewisburg, W. Va., water safety instructor for the American Red Cross, again will head water-front activities.

Camp Wyndal, for the children of colored Koppers Coal miners, will open its sixth season July 6, on the Gauley River near Gamoca, W. Va. There will be three two-week camping periods.

•

Coal Publications

Conference Leadership in Business and Industry, by E. S. Hannaford. McGraw-Hill Book Co. 306 pp., 5¾x9⅛ in.; cloth. Price, $3. Step-by-step procedures in holding conferences.

Buried Treasure, the Story of America's Coal, by M. B. Cothren. 64 pp., 5¾x8¾ in.; cloth. Coward-McCann, Inc., New York. Price, $1.50 Treats of coal, its mining and processing. Fair enough in its judgments, it is unfortunate that the author has visited only one mine. Some errors embodied in popular literature crop up in this narration, such as the use of canaries to discover methane. These are now displaced by safety lamps, says the authoress. Some of her coal friends should have checked her statements.

Control of Bulk Densities in Coke Ovens: Studies on Coal Used at Three Byproduct-Coke Plants, by W. S. Landers, L. D. Schmidt and W. Seymour, U. S. Bureau of Mines. R.I. 3807; 31 pp., 8x10½ in.; paper; mimeograph; free.* Unless coal is very dry, oiling it will increase its bulk density when charged into coke ovens and improve coke, but in some instances this may cause dangerous expansion, injuring coke ovens. Dropped-coal method developed by Bureau to produce typical density of charge.

A Rapid Method for Determining Surface Moisture in Coal, by L. D. Schmidt and W. Seymour, U. S. Bureau of Mines. R.I. 3811; 17 pp., 8x10½ in.; paper; mimeograph; free.* Use of ethyl alcohol, pure or denatured by wood alcohol, or use of other solvents for absorbing, or extracting, surface water. These can be used again and again until water content in absorbent becomes excessive. Quantity of water dissolved can be determined by a hydrometer.

Utilization of Anthracite Fines in the Manufacture of Byproduct Coke, by W. Seymour and L. D. Schmidt, U. S. Bureau of Mines. R.I. 3808; 27 pp., 8x10½ in.; paper; mimeograph; free.* Low-volatile anthracite fines perhaps preferable. From 3 to 5 percent of anthracite may be used. What anthracite to use and how much is a separate problem for each plant.

Permissible Mine Equipment Approved During 1944, by A. B. Hooker, U. S. Bureau of Mines.* I. C. 7316; 4 pp., 8x10½ in.; paper; mimeograph; free. Lists among other more usually recognized permissible equipment, air compressors, coal drills, machinery-moving units, trailer water tanks, distribution boxes, animal

* Apply to U. S. Bureau of Mines.

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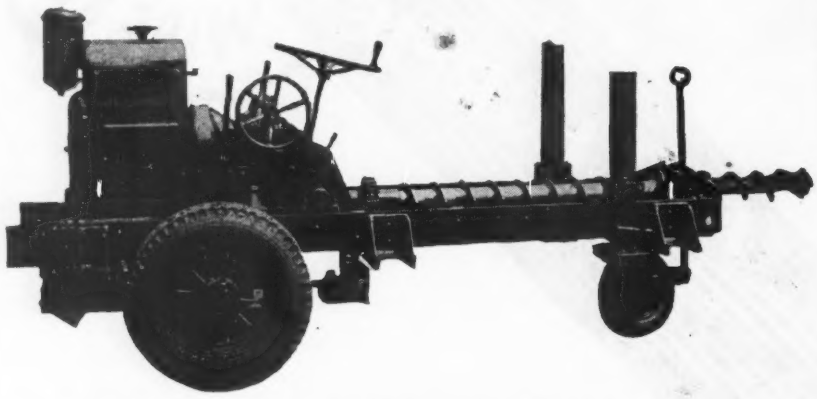

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Shop Safety, National Safety Council, Chicago. 30 pp., 3¼x8¼ in.; paper. Price, one to nine copies, 30c. (members, 15c.); lower prices on larger quantities. Practically all illustrations. These are attractively arranged with pertinent captions.

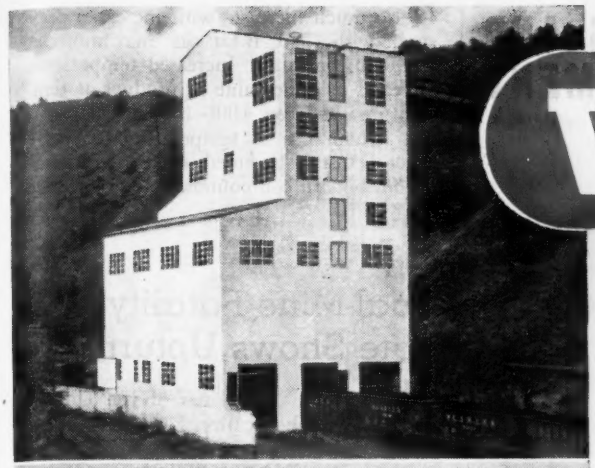
American Management Association. Papers presented at Industrial Relations Conference, February 9-11, 1944. 6x8¾ in.; paper.—Reemployment of Veterans, Personnel Series, No. 76, 50 pp.; 75c.; The New Pattern of Labor Relations, P. S. No. 79, 34 pp.; 50c.; Employer Responsibility for Veteran Reemployment, P. S. No. 83, 50 pp.; 75c.; Personnel Policies of Reconversion, P. S. No. 84, 42 pp.; 75c.; Practical Techniques of Collective Bargaining, P. S. No. 86; 75c.; The Foreman in Labor Relations, P. S. No. 87, 31 pp.; 50c.

Minto Coalfield, New Brunswick, by E. Swartzman, J. J. H. Nicolls, E. J. Burrough and R. E. Gilmore, Bureau of Mines, Mines and Geology Branch, (Canadian) Department of Mines and Resources. 239 pp., 8½x11 in.; paper; mimeograph. Contains preparation flowsheets of all coals, also screen analyses, bulk densities, apparent specific gravities, size stabilities, grindabilities, proximate and ultimate analyses, calorific values, ash fusibilities, sulphur forms, fusain determinations, ash analyses of the several coals and also of the float-and-sink fraction of the 1½-in. slack and the 1¼x4-in. coal. Swelling tests and caking indexes also are recorded.

Materials Handbook, an Encyclopedia for Purchasing Agents, Engineers, Executives and Foremen, 5th edition, by G. S. Brady. 765 pp., 5¾x9 in.; cloth. Price, $5. Materials alphabetically arranged but further supplemented by index. Appendix gives tabular material.

Manual of Instructions on Proper Firing Methods in the Interest of Fuel Combustion and Conservation; Air Pollution and Smoke Elimination—Smoke Prevention Association of America, Inc., 139 N. Clark St., Chicago 2, Ill. 78 pp., 8½x11 in.; paper; mimeograph and type. Price, 25c. Fuel conservation, furnace turbulence, data on fuel oil and its combustion, charts for determining furnace dimensions and underfeed stokers, domestic heating with coke, reduction of smoke in commercial and industrial boiler firing, interpretation of coal analyses, load-carrying capacities of furnaces, Stoker Manufacturing Association's Uniform Stoker Rating, equipment manufacturers' directory.

The Hydrogenation of Coal at High Temperatures, Report No. 3, by J. L. Bray and P. W. Morgal, Purdue University. Research Series No. 93, Engineering Experiment Station, Lafayette, Ind.; 36 pp., 6x9 in.; paper. In all runs 10 to 86 percent excess of hydrogen was used. Calorific value of gas increases from 450 to 560 B.t.u. as temperature rises from 1100 to 1300 deg. F., but is constant thereafter.



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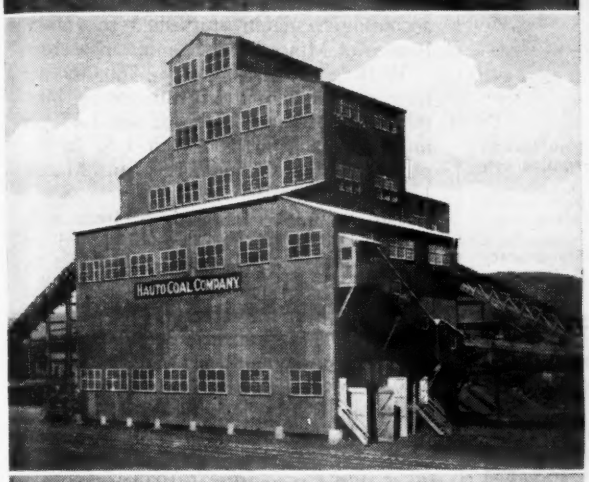

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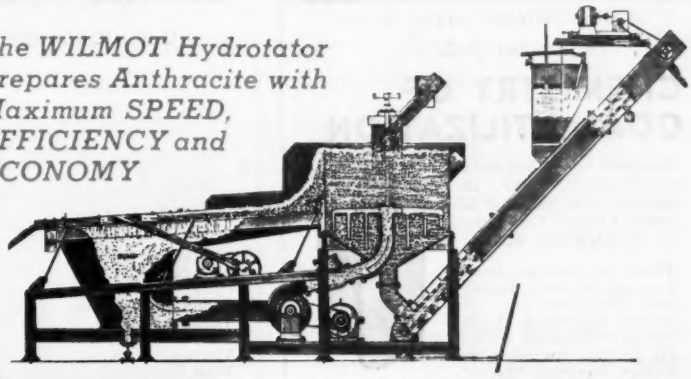

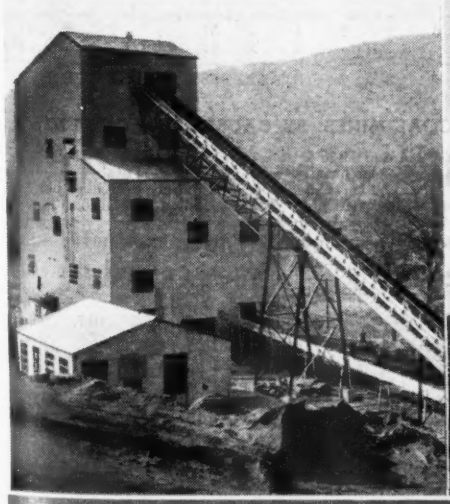

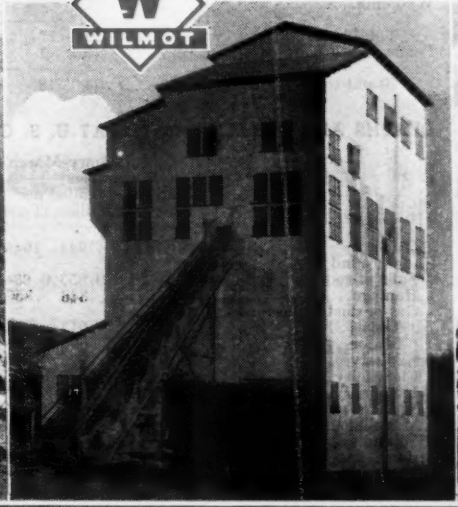

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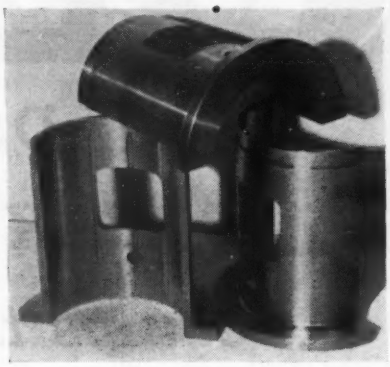

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It also much increases with increased pressure, with 750 B.t.u. as maximum at 5,640 lb. pressure. Increased temperature increases calorific value of product at temperatures between 1000 to 1200 deg. F., after which rise of temperature has little effect. Catalysts failed to accelerate reaction, but tin compounds were not used.

•

Coal-Mine Fatality Rate Shows Upturn

Accidents at coal mines of the United States caused the deaths of 61 bituminous and 13 anthracite miners in March last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 52,360,000 net tons, the accident death rate among bituminous miners in March last was 1.17 per million tons, compared with 1.22 in the preceding month and 1.99 in March, 1944.

The anthracite fatality rate from accidents in March last was 2.49, based on an output of 5,215,000 tons, against 1.36 in the preceding month and 4.12 in the third month a year earlier.

For the two industries combined, the accident fatality rate in March last was 1.29, compared with 1.23 in the preceding month and 2.18 in March, 1944.

Fatalities during March last, by causes and States, as well as comparable rates for the first three months of 1944 and 1945, were as follows:

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CHEMISTRY OF COAL UTILIZATION

Prepared by a staff of 35 Contributors under the auspices of a National Research Council Committee, H. H. LOWRY, Editor

These two volumes present a comprehensive, convenient discussion of our present knowledge of coal and its utilization, including the vast American and foreign literature, the patent literature, and much unpublished data. Note the wide coverage indicated by the partial contents listed below.

VOLUME I covers the origin, classification, petrography, calorific value, chemical and physical constitution of coal; fusion, flow, and clinkering of coal ash; cleaning of coal; changes in coal on storage; action of solvents on coal; vacuum distillation of coal; coal carbonization; coke.

VOLUME II includes the recovery of sulfur, nitrogenous compounds, and miscellaneous constituents from coal gas; light oil from coke-oven gas; utilization of coal gas; chemical nature of coal tar; ammoniacal liquor; combustion; electricity from coal and gas; hydrogenation of coal and tar; synthesis of hydrocarbons and of methanol.

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Please send me a set of Lowry's COAL UTILIZATION on ten days' approval. At the end of that time, if I decide to keep the books, I will remit $20.00 plus postage; otherwise I will return the books postpaid.

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U. S. COAL-MINE FATALITIES IN MARCH, 1945, BY CAUSES AND STATES

State	Underground: Falls of Roof	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Open-cut	Surface	Grand Total
Alabama	4	2	..	..	..	..	..	6	..	..	..	6
Colorado	..	..	..	..	1	1	..	7	..	..	..	2
Illinois	4	4	..	1	..	..	..	9	..	..	..	9
Kentucky	4	1	..	..	..	..	..	5	..	1	..	6
Maryland	1	..	..	..	..	..	..	1	..	..	..	1
Ohio	1	..	..	1	..	..	..	2	..	..	..	2
Penna. (bituminous)	8	5	..	..	..	..	..	13	..	..	..	13
Tennessee	..	1	..	..	1	..	..	2	..	..	..	2
Utah	..	..	6	..	..	..	..	6	..	..	..	6
Virginia	..	1	..	..	..	..	..	1	..	..	..	1
West Virginia	6	3	..	..	..	..	..	9	..	1	2	12
Wyoming	1	..	..	..	..	..	..	1	..	..	..	1
Total bituminous	29	17	6	2	2	1	..	57	..	2	2	61
Penna. (anthracite)	5	1	..	1	..	2	2	11	1	..	1	13
Gtand total	34	18	6	3	2	3	2	68	1	2	3	74

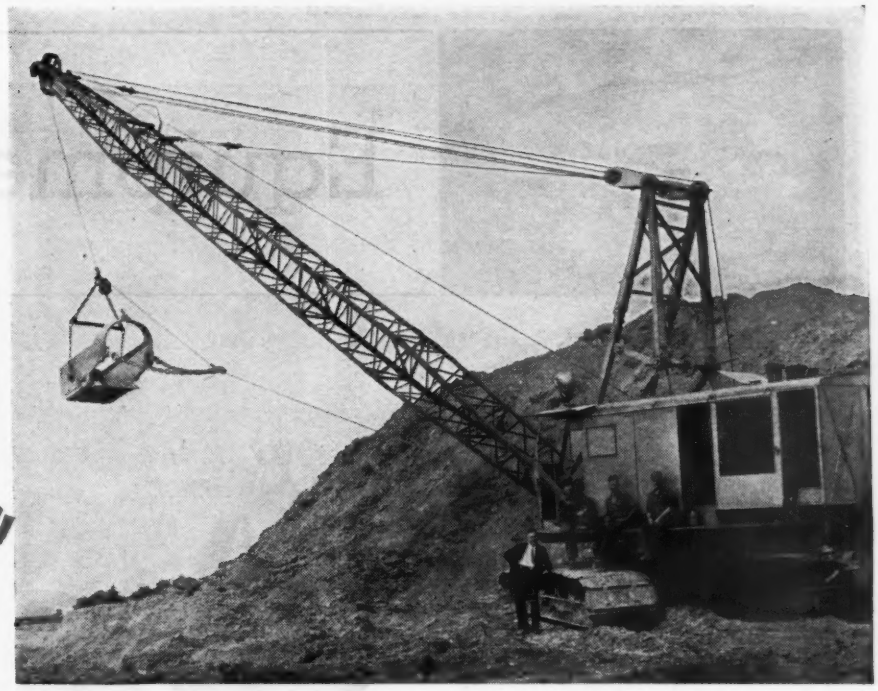
DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January-March, 1944 and 1945

Cause	Bituminous: Number Killed		Killed per Million Tons		Anthracite: Number Killed		Killed per Million Tons		Total: Number Killed		Killed per Million Tons	
	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945
Underground:												
Falls of roof and coal	154	96	0.953	0.634	30	18	1.820	1.299	184	114	1.033	0.690
Haulage	56	53	.346	.350	9	3	.546	.217	65	56	.365	.339
Gas or dust explosions:												
Local	2	5	.012	.033	1	...	.060	....	3	5	.017	.030
Major	16	15	.099	.099	...	...	....	....	16	15	.090	.091
Explosives	4	7	.025	.046	7	2	.425	.144	11	9	.061	.054
Electricity	9	3	.056	.020	...	...	....	....	9	3	.050	.018
Machinery	8	11	.049	.072	...	2	....	.144	8	13	.045	.079
Shaft	3	1	.019	.007	...	...	....	.072	3	2	.017	.012
Miscellaneous	6	....	.037	....	4	5	.243	.144	10	2	.056	.012
Stripping or open-cut	5	6	.031	.039	2	...	.121	....	7	6	.039	.036
Surface	14	11	.086	.073	6	5	.364	.361	20	16	.112	.097
Total	277	208	1.713	1.373	59	33	3.579	2.381	336	241	1.885	1.458

* All figures subject to revision.

HOW "Riding Comfort"



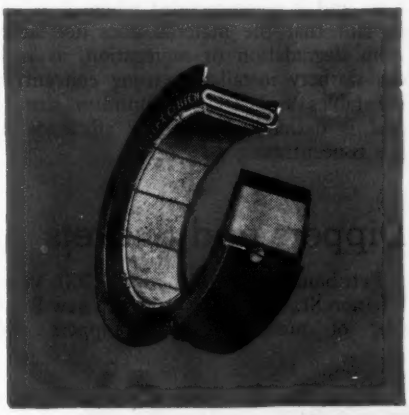
Saves Money in Material Handling

All heavy machines are more efficient and cost less to run when they are free from clutch troubles.

The Fawick Airflex Clutch gives them new smoothness, new freedom from vibration, by operating through a cushion of air and rubber, as effective as the cushion of air and rubber that gives the motor vehicle comfort and longer life.

With this clutch, no springs, arms or toggles are needed. There are no adjustments to make—no lubrication required. Maintenance costs are low. Even misalignment is corrected automatically.

By controlling inflation, clutch engagement is as light or as firm as the job demands. And there is complete nonmetallic safety for both drive and driven members.



Let our engineering department give you the benefit of their broad experience in the form of definite recommendations for your machines.

• •

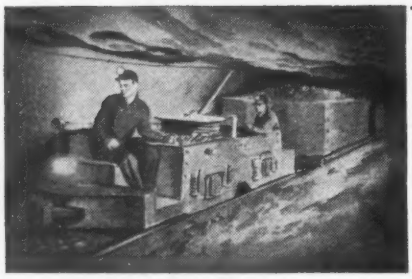
The Fawick Clutch provides air-cushion clutch action because it matches today's fine motor vehicle tires in quality of materials and excellence of workmanship—the result of the great technical advances made by America's Rubber Industry.

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Rd. • Cleveland 11, Ohio
***In Canada,* Renold-Coventry Ltd., Montreal, Toronto, Vancouver**
***In Britain,* Crofts Engineers, Ltd., Bradford, England**

ARMY E NAVY

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR



Equipment News

Wire Stripper

A new wire stripper for stripping rubber insulation, asbestos, synthetic, plastic, glass, cambric and other insulations is offered by the Ideal Commutator Dresser Co., 1013 Park Ave., Sycamore, Ill. Any length of wire or cable, up to $\frac{3}{8}$-in. diameter—single or parallel conductor—can be stripped. Plain or grooved blades are used, depending on the type of wire.

Parallel wire, heater cord, inner conductors and POSJ cord can be stripped with plain blades; the grooved blades are intended for rubber-covered and weatherproof cable. To use the stripper simply lay wire in position between the jaws and cutting blades and pull the handle. This causes the gripping jaws to grasp the wire and draw the wire through the oscillating blades. The pulling action is in a straight line, eliminating scraping and picking of wire.

•

Conveyor

An entirely new type of conveyor, to be known as the Sidekar-Karrier, designed to handle bulk materials in a horizontal run-around path, within minimum headroom, is offered by Link-Belt Co., Chicago.

The conveyor is said to be both self-feeding from any one of many feed spouts which may be located above its horizontal run-around path of travel and self-discharging to any number of points, permitting continuous automatic operation. The material is carried in buckets supported on rollers, rather than being dragged by flights in a trough. The design is such that two or more materials can be separately fed to the conveyor with the assurance that the admixture will not be disturbed in transit and that it will be delivered to any predetermined discharge point in exactly the same mixed proportions as prevailed at the feed points.

Two types are available: Type 1 is recommended for boiler-house applications, where coal is kept in bunker storage and delivered to one or more scale hoppers. Type 2 has been designed to handle capacities of up to 100 tons per hour and is recommended where it is important that the material does not suffer from degradation or segregation, as in a coal-washery installation using concentrating tables and where a uniform size of coal is desirable for higher efficiency of the concentrating tables.

•

Dippers and Buckets

Pettibone Mulliken Corp., 4700 West Division St., Chicago 51, offers a new Big 4 line of material-handling dippers and buckets. Interchangeable teeth on $\frac{1}{2}$- and $\frac{3}{4}$-yd. sizes of all the buckets except the clamshell are a popular feature.

•

Thermoplastic Tape

A transparent flexible thermoplastic tape, greatly facilitating inspection and servicing of equipment on which it is used, has been introduced by the Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington, N. J.

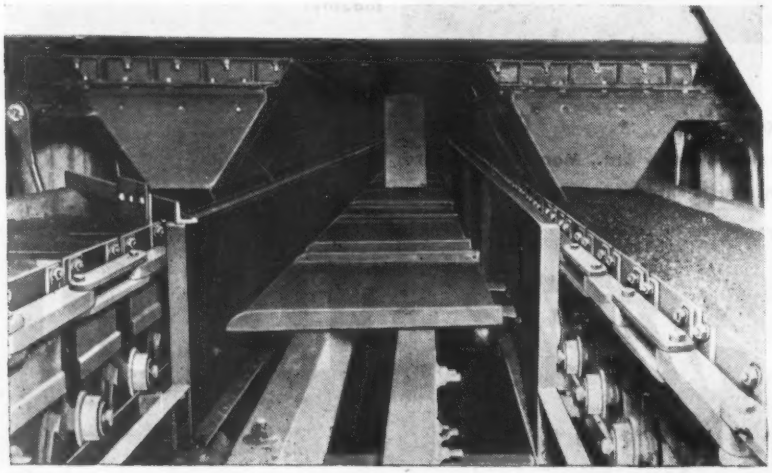
Useful not only as electrical insulation, Fibron Tape No. 3, it is said, also protects wiring, cables and equipment against abrasion. The tape is said to be heat-sealing, flame-resistant, flexible at low temperatures and resists attack by acids, alkalis, moisture, oil, grease and corrosive fumes. With proper adhesives, it may be bonded to fabrics, metal, ceramics, wood and other materials.

•

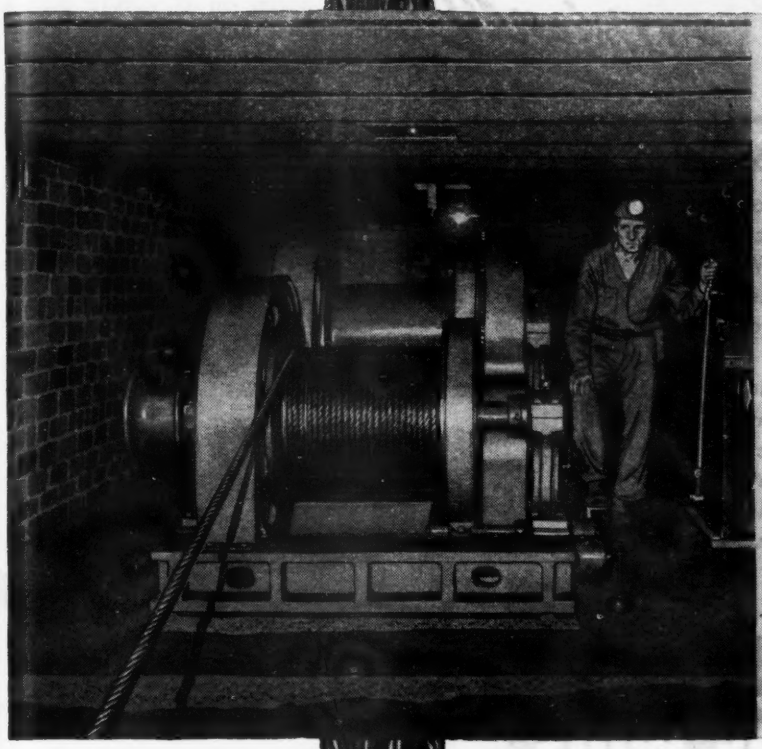
Machinist's Vise

Grand Specialties Co., Grand Ave. at Troy, Chicago 22, offers a completely new quick-action machinist's vise. Known as the Quikcet alloy-steel machinist's vise, it is manually operated but eliminates running in or out the screw to close or open the vise; it is asserted that it can be set and closed in a jiffy simply by pushing on body of the free jaw, which slides in swiftly on ratchet screw and two precision guide rods and tightens with a turn of the handle. The vise is equipped with a trigger release pawl with $\frac{3}{4}$ in. of thread that holds the hardened screw under spring tension.

Additional features claimed for it are that it has extra thick wall, body construction and extra heavy precision guide rods and balanced precision grip at all points,



J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE



J.&L.
PERMASET PRE-FORMED
WIRE
LINES

Precisionbilt from wire that can stand hard use. Mining operations are tough on wire rope — abrasion, water, muck combine to test its endurance. Rope made from J&L wire, drawn from J&L Controlled Quality Steel, has the stuff it takes to stand up to these conditions. From the mines where J&L gets its raw materials to make the steel . . . to the installation in your mine . . . J&L controls every step in the making of its Precisionbilt Wire Rope.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, AND MUNCY, PENNSYLVANIA

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

STEP-UP Screen Efficiency
IN YOUR COAL MINE

You can be assured of uniform results . . . cut down expensive maintenance costs—by installing non-clogging, quality-built Wedge Wire Screens at your plant. These screens have the famous, quick-clearing wedge design. This assures faster screening action in openings as small as ¼ m.m. Built of wear resisting stainless steel, they're providing users with long, trouble-free periods of operation. Our engineers will be glad to consult with you at no obligation. Call on us today by wire or telephone for free information on low cost Wedge Wire Screens.

★ Quick and easy clearance . . . faster, cleaner screening.
★ Precision-built for long life.
★ Screen openings ¼ to 2 m.m.
★ Stainless steel construction . . . less maintenance.

LONG LIFE, NON-CLOGGING PROCESSING SCREENS

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of more than 12,000 subscribers of COAL AGE.

Your problems of mine management, production and maintenance—business or individual—are duplicated with *other* readers BUT—

Still *OTHER* readers can provide the solution of your problem if they *know what it is!*

Tell them through classified advertising in the Searchlight Section of "Coal Age"—*your* business paper and *theirs.*

FLEXIPIPE
The improved flexible tubing for mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by a more rigid means of face ventilation.

Write for free sample and full information.

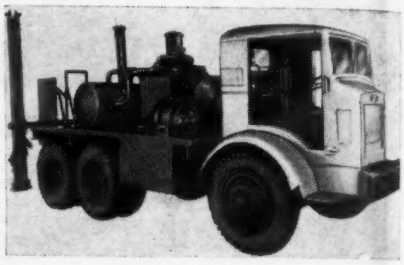
BEMIS BRO. BAG CO.
412 Poplar Street, St. Louis 2, Mo.

with polished, serrated and hardened jaws integral with the body. It also is said to be spatterproofed for welding use with copper plating on all working parts and handles, and rustproofed with gray wrinkle enamel finish.

•

Drilling Machine

Evansville Electric & Mfg. Co., 600 West Eichel Ave., Evansville, Ind., offers an electric portable drilling machine for use in coal and rock. Two Ingersoll-Rand wagon-type drifter drills operating simultaneously are powered by an I-R Type 75-B two-stage air-cooled air compressor V-belt driven by a 76-hp. totally inclosed motor furnishing 100 lb. of air pressure.



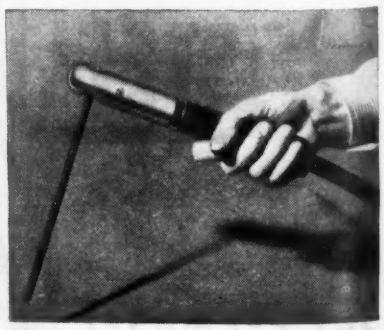
The machine is mounted on a 30-ton Autocar chassis having twelve wheels propelled by a 30-hp. slip-ring motor controlled from the cab by a reversible-type controller driving motor through a double chain reduction to the main drive shaft, producing a ratio of 9½ to 1. Suitable transformers are carried in the cab to furnish power for floodlighting.

•

Electrode Holder

A new armor-clad (screw-type), fully insulated electrode holder is offered by the Electric Welding Division of the General Electric Co., Schenectady, N. Y. A feature of the new holder is its head, which is completely inclosed in a sheath of aluminum armor, protecting the insulation, resisting weld spatter and eliminating the possibility of accidental contact with the welding circuit.

Designed to accommodate electrodes up to and including ¼ in. in diameter, the holder is said to be easy to use, light in weight (15 oz.) and unusually cool in operation. A slight twist of the hand tightens or releases the electrode. The threads of the push-up rod do not carry current. A soldered cable connection also helps the holder to remain cool. The



You'll find exceptional ruggedness and stamina in the Dragliner without excess weight — soundly engineered design and generous use of high tensile alloy and tough manganese steels make possible this long-lasting bucket. It's a prime stripping tool, hogging up full loads fast whether it's shale, gravel or shot rock.

These five features of the Dragliner put zip in your overburden stripping:

1. **Heavy manganese steel bumpers prevent bucket from dropping on the arch. They *last longer!***
2. **Flat top arch eliminates binding and increases digging efficiency. Loads are *dumped faster!***
3. **3-Way dump hitch—choice of 3 positions —provides ideal bucket dumping angle. *Faster dumping means more yardage!***
4. **Rugged, reinforced body. Smooth interior—faster loading.**
5. **Wear resistant manganese steel lip made in four or five-tooth types. They dig *faster and resist wear!***

See complete specifications and action pictures in Catalog 14. Ask for name of your local dealer.

BUILT IN THE SHOPS OF

UNIVERSAL ENGINEERING CORP.

CEDAR RAPIDS, IOWA

"LOOK FOR THE ROUND BUMPER" D-M

DESIGNED AND ENGINEERED BY

DANIELS-MURTAUGH CO.

625 C Ave. West, CEDAR RAPIDS, IOWA

LUBRIPLATE No. 105

This very smooth, light density (semi-fluid) grease type lubricant resists water and other unfavorable operating conditions to a marked degree. LUBRIPLATE No. 105 not only provides superior lubrication but offers utmost protection against rust and corrosion. Because of its water-proof feature and freedom from "drag", it is ideal for

General Industry	Firearms
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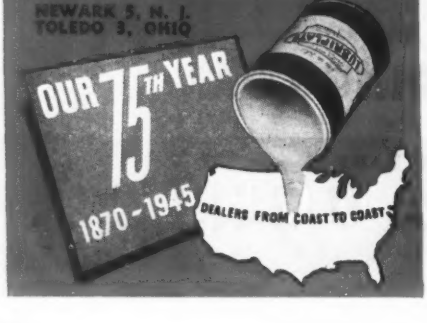
LUBRIPLATE
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE
Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE
Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

Write for a booklet, "The LUBRIPLATE Film", written especially for your industry.

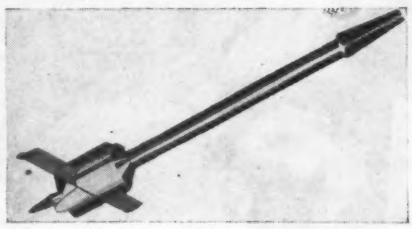
LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J.
TOLEDO 9, OHIO



width of the electrode slot limits the size of the electrode that can be inserted, thus preventing overloading.

Cutting Tool

"A cutting tool for a thousand uses," the Zim cutter No. 2, is offered by William-Leonard & Associates, Cleveland, Ohio. A razor-edge disk knife, it is said, easily and safely operated by hand, cuts cleanly and quickly any pliable material



up to 1½ in. wide; an adjustable measuring device instantly sets the desired length so that one or any number of pieces can be cut to uniform size within the shortest possible time.

Lubricator

The Handi-Luber, offered by the Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo., is said to make it possible to convert an ordinary original grease container into a 25-lb. high-pressure grease gun. Model 1266 Handi-Luber is a compact, strongly built grease pump equipped with a 5-ft. hose assembly with hydraulic coupler containing all Kleenseal and hydraulic fittings. Manually operated, it dispenses either light cup grease or viscous types. One man, it is said, can operate and carry it with ease.

Safety-Hook Latch

Thomas Laughlin Co., Portland, Me., offers a newly designed latch for its safety hooks, used for general hoisting and materials handling, plane and cargo lashing, suspending tools, etc. This improved latch is said to give 80 percent of the full throat opening, and its proper operation decreases the possibility of overloading and overcrowding.

The wider throat opening results from the way the latch assembly, when open,

with **DINGS**
Magnetic Separators

1. Save Machinery
2. Salvage Usable Parts
3. Salvage Saleable Iron
4. Protect Customer Good Will

TRAMP IRON wrecks crushers, chain drives, chain conveyors, etc.—damages customers' stokers. Prevent this loss with Dings magnets and recover valuable cutter bits, bolts, nuts, as well as scrap iron. Dings magnets pay for themselves while they protect—and then provide an extra source of profit.

Investigate Dings Drum, Pulley, Spout, Suspension and other type magnets today. Write to Dings — the world's largest exclusive builder of magnetic equipment.

DINGS MAGNETIC SEPARATOR CO.
506 East Smith Street
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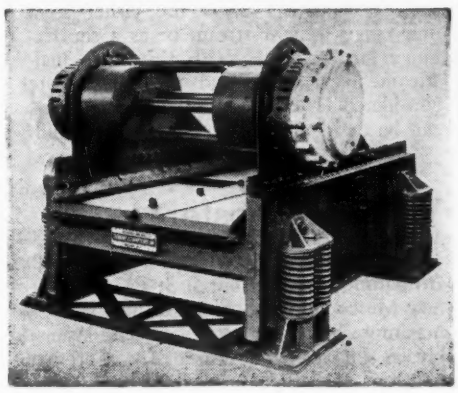
Dings
"HIGH INTENSITY"

Now you can SELL those 1/8" to 0" sizes



For years, they have been considered waste. Now you can sell those 1/8" to 0" sizes—helping not only the Coal Conservation Program but yourself as well.

The problem always has been how to salvage these small sizes after the washing operation. That problem has now been solved . . . with a specially-constructed Robins Eliptex Screen.

The residue in the sludge tank is repumped through the washery. After the +3/16" has been scalped-off and the refuse removed by flotation, the fines are fed to the Eliptex Screen in a fluid mixture at the rate of about 430 gallons per minute.

Through a combination of baffles in the Screen and a unique arrangement of the small-mesh Screen Cloth, the fines are made to cling together, forming a blanket of coal across the deck, while the water passes on through.

When the experimental period began, 47% of the water remained. At the end of the period, only 12% remained — 88% of the surface-moisture was removed, with no appreciable loss of fines. Reports show that this percentage is constant—that 25 to 60 tons per hour of 1/8" to 0" sizes are being salvaged from the waste pile.

Complete facts about this operation are interesting enough to warrant prompt investigation. An engineer from our nearest office will place them before you, without cost or obligation. When inviting his call, please address Dept. CA-6.

ENGINEERS, MANUFACTURERS AND ERECTORS OF MATERIALS HANDLING MACHINERY

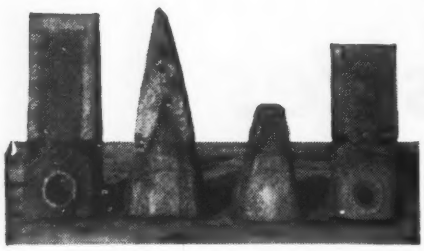
ROBINS *makes:* BELT CONVEYORS · COAL AND ORE BRIDGES · BUCKET ELEVATORS · CAR AND BARGE HAULS · CAR DUMPERS · CAR RETARDERS · CASTINGS · CHUTES · CONVEYOR IDLERS AND PULLEYS · CRUSHERS · FEEDERS · FOUNDRY SHAKEOUTS · GATES · GEARS · GRAB BUCKETS · PIVOTED BUCKET CONVEYORS · VIBRATING SCREENS · SCREEN CLOTH · SELF-UNLOADING BOAT MECHANISMS · SKIP HOISTS · STORAGE AND RECLAIMING MACHINES AND SYSTEMS · TAKEUPS · LOADING AND UNLOADING TOWERS · TRIPPERS · WEIGH LARRIES · WINCHES · WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . It's ROBINS

ROBINS
CONVEYORS
INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

Your Worn Dipper Teeth Are Still

"Good as Gold!"



From left to right: (1) Ready for service,—bucket tooth hard-faced along sides and at point after new tip has been welded on worn tooth. Note hard-facing protection around hole. (2) The same tooth, side view. (3) Typical worn tooth. (4) The same after welding on a new tip.

DON'T DISCARD old bucket teeth,—no matter how badly worn. Rebuilding and hard-facing with Coast Metals will make them good as new,—at less than half the cost of new replacements!

In fact, Coast Metals Hard-Facing makes your power shovel and bucket lips and teeth *better than new*, since they will outlast and outwear ordinary unprotected lips and teeth several times. You can use Coast Metals Hard-Facing also for minimizing wear on tractors, dirt movers, rooters, rippers, crushers and other earth-moving and road building equipment.

Patented Coast Metals Hard-Facing alloys are easily welded to all ferrous metals, including manganese steel, alloy steels, cast iron and chilled iron. Write for full details.

COAST METALS, INC.
Plant and General Offices: Canton, Ohio
Executive Offices: New York, N. Y.

COAST METALS

hard-facing weld rods

MAKE YOUR EQUIPMENT LAST LONGER

straddles the neck of the hook. The load to be hoisted is slipped into the hook but cannot be removed until the operator's fingers release the latch. If the hook is overcrowded, the latch will not slip into place; if the hook spreads because of excess loading, the latch pops up as a warning signal.

•

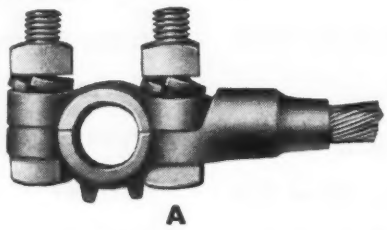
Fire Extinguishers

Dugas Division of Ansul Chemical Co., Marinette, Wis., offers a new dual-stream nozzle that greatly increases the fire-fighting effectiveness of its wheeled fire extinguishers. It permits the operator to apply the dry chemical on a fire either as a long-range straight stream or as a shorter-range fan stream. With this new dual-stream nozzle, overhead fires, heretofore considered exceedingly difficult to fight, can be extinguished successfully, it is said.

•

Voltage Booster

Mosebach Electric & Supply Co., 1150 Arlington Ave., Pittsburgh 3, Pa., offers a new Mesco voltage booster for maintaining maximum voltage at the face. The assembly, as illustrated, consists of (*A*) a bronze bolt-type feeder clamp and (*B*) a bronze trolley clamp which are connected by a flash-welded 4/0 flexible strand copper cable. The booster is hooked to the feeder line with the clamp, held securely by two bolts, to equalize the voltage between the feeder and the trolley line.



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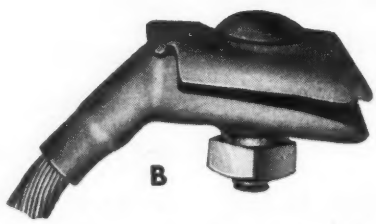


B

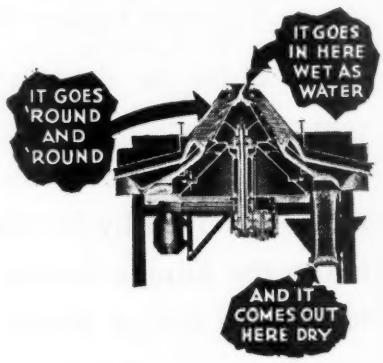
By employing this method it is said to be possible to maintain maximum voltage at the face, so necessary in mechanized mining. These boosters, which are patended, can be furnished with connections for any size feeder and trolley wire.

•

Tachometer

Chicago Electric Tachometer Co., 800 North Clark St., Chicago 10, Ill., offers a portable electric tachometer to determine whether the speed of machines, belts, pulleys, etc., is proper for maximum production. The new model—No. 5-E—is small and compact, easy to hold in the hand and

FOR the most economical and simple method for dewatering and drying the smaller coal sizes. The many installations in modern coal washing plants are proof of this. We shall be glad to give you the details of the installations.



Sludge and slurry coals are also being reclaimed by using this machine. Where a large part of the ash is in the finest sizes, ash content as well as the water content is reduced.

Centrifugal and

Mechanical Industries,
INC.
3600 South Second Street
St. Louis 18, Mo.

It TOOK A MILLION YEARS TO CREATE YOUR PRODUCT...

You can improve its quality and market value in a few minutes!

● Yes, you can improve on the work of centuries by processing your coal through a FAIRMONT-designed and erected preparation plant . . . preparing it to meet the high quality standards of today's markets. We urge you to contact FAIRMONT now on your postwar requirements.

For wet cleaning processes, specify the Chance Sand Flotation System; for dry cleaning, The American Pneumatic Separator. FAIRMONT supplies and installs both. Be ready to meet with speed, economy and efficiency demands for scientifically prepared coal.

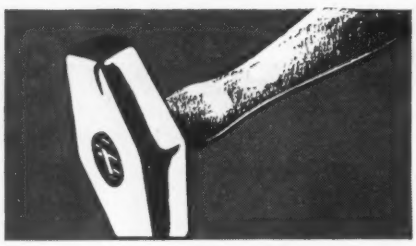
TRADE MARK REGISTERED

FAIRMONT MACHINERY COMPANY

FAIRMONT, W. VA.

IT'S EASIER AND QUICKER

to use this



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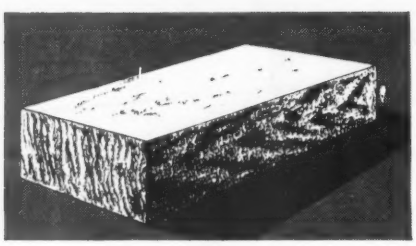

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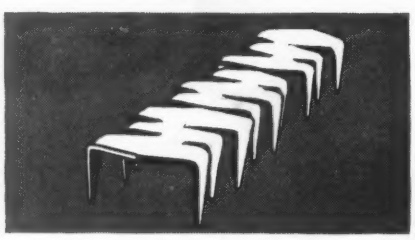

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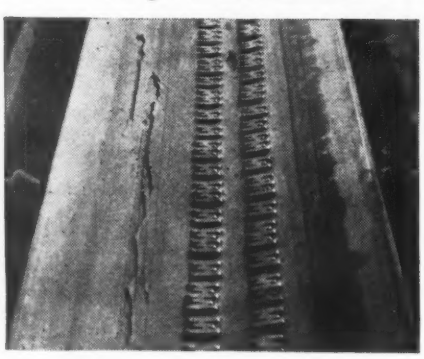


BRISTOL'S BELT LACING

For rubber or woven conveyor belts up to $13/16$" thick.
Write for Bulletin 736.

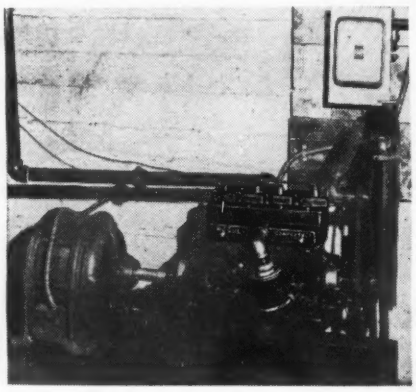
THE BRISTOL COMPANY
Mill Supply Division
139 Bristol Road, Waterbury 91, Conn.
DISTRIBUTORS EVERYWHERE

can be operated, it is said, in close quarters. It indicates the speed or motion of a revolving or moving object by merely applying the rubber-tipped shaft to the work. Vibration transmitted through the shaft does not interfere with the accurate reading of the indicator.

•

Compressor Head

Metallizing Co. of America, 1330 Congress St., Chicago 7, offers a new compressor head that will put scrap blocks to work. The manufacturer says it is designed for use on a Model A or B Ford motor block. The head is further designed



to deliver a volume of 139 c.f.m. with an actual delivery of 100 c.f.m. at 100 lb. pressure. The complete unit includes valve and water chambers, air intake manifold, air strainer, unloader, pilot valve and necessary parts for assembly. Complete instructions are included with each unit.

•

V-Belting

Addition of an "A" section to its line of open-end V-belting is announced by the B. F. Goodrich Co., Akron, Ohio. Used where endless V-belts do not meet requirements, the company's open-end V-belting is now available in these four sizes: "A," with $\frac{1}{2}$-in. top width and $\frac{5}{16}$-in. thickness: "B," $\frac{21}{32}$-in. top width and $\frac{7}{16}$ in. thick; "C," $\frac{7}{8}$-in. top width and $\frac{5}{8}$ in. thick; and "D," $\frac{1}{4}$-in. top width and $\frac{3}{4}$ in. thick.

Extension of the application of open-end V-belting has been made possible by development of a new fastener named "Flex V" by the Flexible Steel Lacing Co. This fastener also can be used on "B" section open-end V-belting, and is said to be simple, inexpensive and easily applied.

•

Industrial Notes

Equipco Sales Co., 2227 Janes St., Pittsburgh, Pa., is the name of a sales agency formed by the Phillips Mine & Mill Supply Co. It will specialize in all material handling equipment for coal mines and coal stripping operations. Officers are John M. Phillips Jr., James M. Phillips and A. Burns Speer. C. C. Burnett is sales manager.

John A. Roebling's Sons Co., Trenton, N. J., has named Ernest C. Low,

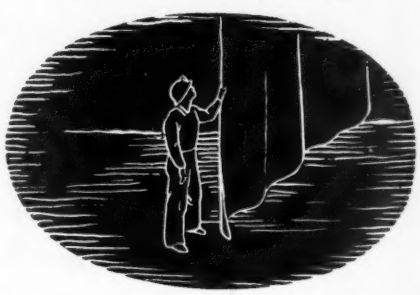
You can't go very far on tires that need air—in fact it's costly—they've got to have air to stay in good condition and deliver the very best of service.

ABC JUTE BRATTICE CLOTH

The same goes for your men too—they need good air to produce the most. ABC Cloth is woven from heavy yarns and is skillfully and uniformly loomed throughout. Our research department has conducted many tests in the use of chemicals in treating the cloth to insure the very utmost in protection against the various forces that destroy ordinary types of cloths.

If yours is a very wet mine, you'll have no shrinkage troubles. If fungi prevails, ABC Cloth will resist infection. It too will resist flame. You are assured well ventilated working places because you'll have no leaks in the cloth.

Write for complete details.

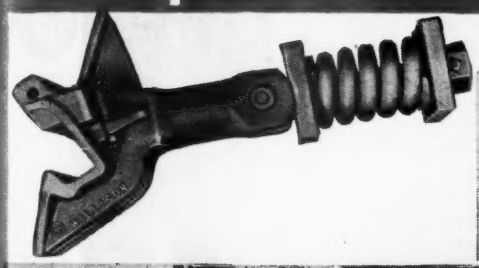


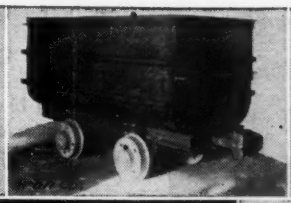
Invest in Victory
BUY WAR BONDS

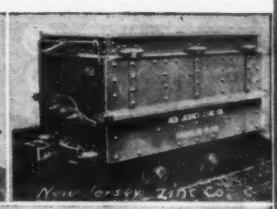
AMERICAN BRATTICE CLOTH CORP.

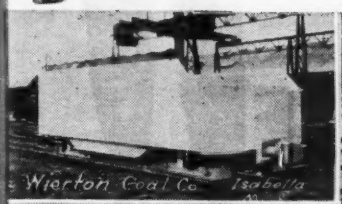
WARSAW - INDIANA

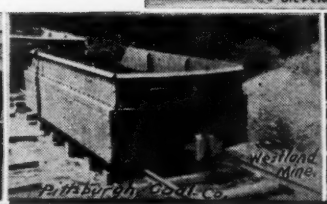
WILLISON AUTOMATIC COUPLERS
Speed Production At Many Mines

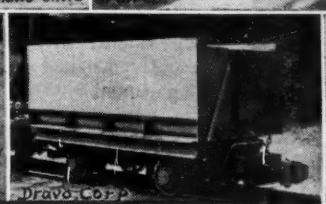


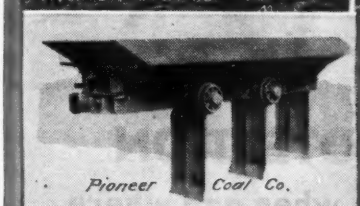


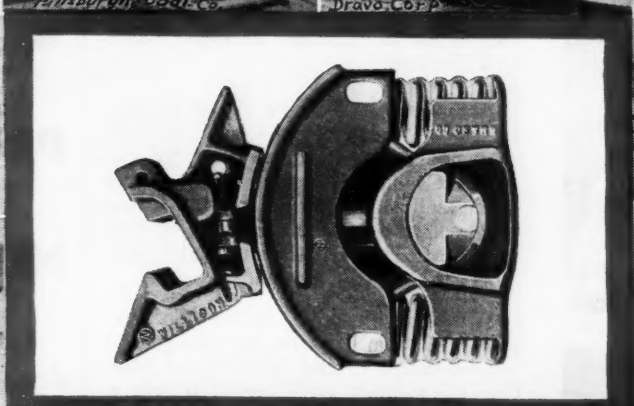


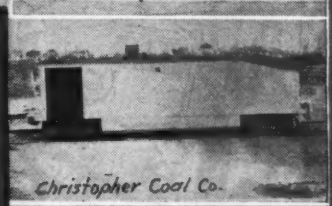


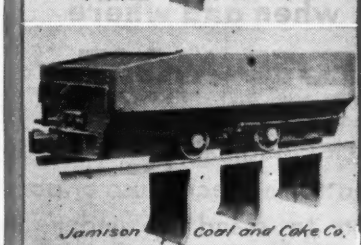


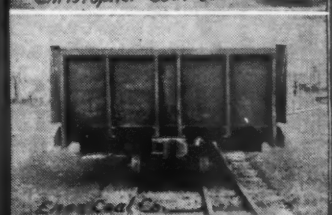


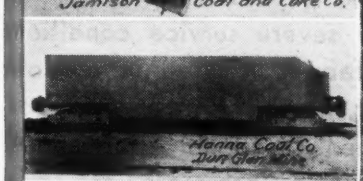


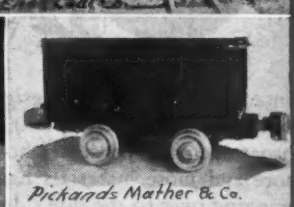


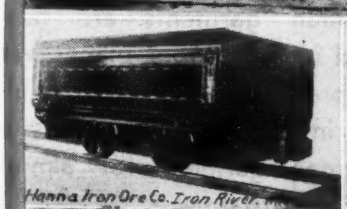


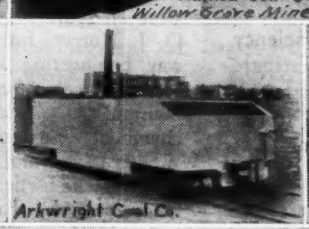


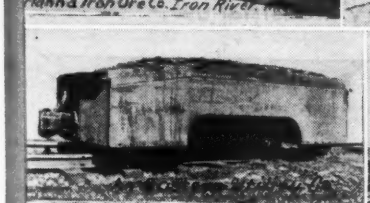


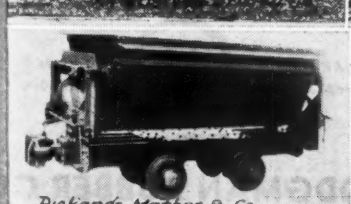


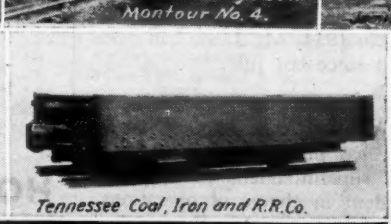




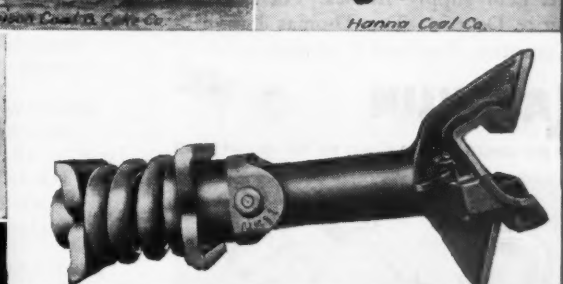








NATIONAL MALLEABLE & STEEL CASTINGS CO.
CLEVELAND OHIO



A SAFETY HOOK
that's as
EASY TO USE
as a risky one

Since Laughlin's newly-designed latch provides approximately 80% of the throat opening of ordinary hoist hooks, more and more materials handlers are swinging over to the safe side.

You, too, can add safety to efficiency by making loads jolt-proof. Investigate these rugged, drop-forged, heat-treated, standard-type hoist hooks with sturdy latches and stainless steel springs (½ to 15 ton safe load).

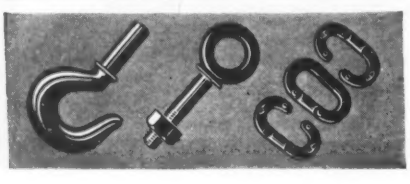
THE LAUGHLIN HOOK LINE

Laughlin has the most complete line of hooks: grab hooks, hoist hooks, cargo hooks and others. All are heat-treated, drop-forged and weldless.

Distributed through mill, mine, and oil field supply houses. For catalog, write Dept. 6, The Thomas Laughlin Company, Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



general manager of sales, who has been with the company since 1910, as vice president in charge of sales. John D. Thompson, works manager, who has been with the company since 1940, becomes vice president in charge of production; Charles M. Jones, manager of engineering and with the organization since 1926, now is vice president in charge of engineering, and Archibald W. Brown, treasurer and with the company since 1902, has been elected to the board of directors.

CRANE Co., Chicago, has appointed Lucien W. Moore as general manager of sales and branch houses, vice J. A. Dwyer, recently made vice president in charge of sales and branch houses. F. J. Wilkey, Chicago, district manager, has been appointed manager of the valve and fitting department, Mr. Moore's position until recently assigned in France by the War Department.

GENERAL ELECTRIC Co., Schenectady, N. Y., has appointed J. J. Huether as assistant manager of the industrial divisions and W. A. Wirene as manager of the industrial materials divisions, industrial divisions.

ALLIS-CHALMERS MFG. Co., Milwaukee, Wis., has appointed Charles F. Codrington as assistant to the manager and A. E. Caudle as sales manager of the blower and compressor department. Ernest Franks has been placed in charge of sales of industrial wheel tractors and power units in the tractor division.

WICKWIRE SPENCER STEEL Co. has appointed Alvin F. Franz, formerly general superintendent of the Allan Wood Steel Co., Philadelphia, for 15 years, as general superintendent of the Buffalo plant. Wickwire Spencer Metallurgical Corp., a subsidiary, has named Theodore A. Havens Jr. as tungsten engineer.

TIMKEN ROLLER BEARING Co., Canton 6, Ohio, has elected Albert L. Bergstrom as vice president of all engineering, after 16 years' service with the company. O. J. Horger, formerly in charge of railway engineering and research, has been appointed chief engineer of the railway division. C. L. Eastburg, who is in active charge of design of bearings and parts as applied to locomotives, has been appointed assistant chief engineer of the railway division. P. C. Paterson, who has been active in the inspection and procurement of material and in equipment applications, will be service manager of the railway division.

ATHEY TRUSS WHEEL Co., Chicago, has elected B. F. Lease as president, vice C. Kier Davis, deceased. Starting with the company in 1931, Mr. Lease had been vice president since last July.

AMERICAN MANGANESE STEEL DIVISION of American Brake Shoe Co., Chicago Heights, Ill., has promoted J. L. Mullin from general superintendent of foundries to vice president in charge of operations, with headquarters in Chicago Heights.

A. MILNE & Co., with warehouses in New York, Boston, Chicago, Pittsburgh and Philadelphia and an office in Wash-

PROTECTION
when and where
NEEDED MOST

Each Hodgman garment is designed for a specific use or occupation to stand up under the most severe service conditions. All fabrics, coated in our own plant, meet the most rigid government specifications. All Hodgman garments are reinforced in the proper places, are waterproof and provide the utmost in comfort. There is a Hodgman garment for almost every industrial use.

PROTECTIVE CLOTHING

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HODGMAN RUBBER COMPANY

for latest Catalogue

HODGMAN RUBBER CO.
Framingham, Mass.

New York 6, 261 Fifth Ave. | Chicago 2, 173 W. Madison | San Francisco 5, 121 Second

Now!

KENNAMETAL DRILL BITS

. . . . . WITH CUTTING TIPS OF TOUGH, HARD KENNAMETAL BRAZED INTO ONE-PIECE, DROP-FORGED, ALLOY STEEL SHANKS

Kennametal-tipped Drill Bits are now available, in the six sizes listed below, to increase production rates and reduce costs of mechanical drilling operations. They can be used in hand-held or post-mounted drills, as well as in track or rubber-tired drilling machines.

and AN ENTIRELY NEW TYPE DOUBLE-SPIRAL SOLID CENTER AUGER*

These revolutionary new bits are one-piece, alloy-steel drop forgings, heat-treated, with brazed-in cutting tips of durable Kennametal—the cemented carbide that is exceptionally tough and hard (75 to 76 Rockwell C compared to 66 to 67 for the hardest tool steels).

Kennametal Drill Bits have been thoroughly tested, and service results show that they can be fed at a higher rate with less power consumption, will drill far more footage before resharpening is required, and can be reground a score or more times. Their design assures continuous maintenance of hole gage, without over- or under-drilling. They cut very hard materials, making auger drilling practicable in some instances where previously it was impossible.

**To make fullest use of the advantages inherent in Kennametal Drill Bits, we have perfected a new, double-spiral, conveyor-type auger—a solid-center, rolled shape, made of forged alloy steel, heat-treated. Its sturdiness minimizes whip, and aids in maintaining gage. The driving shank is shaped to enable the auger to be quickly attached to, or detached from the machine simply by "a twist of the wrist."*

Write for additional information on Kennametal Drill Bits, giving details of your operations.

SPECIFICATIONS

DRILL BIT			AUGER *		
DIA.	CATALOG NO. Track or Post Mtd.	CATALOG NO. Hand Held	DIA.	STYLE NO.	Purpose of Drilled Hole
1⅜"	.....	D1-H	1¼"	1A	Trolley wire hanger
1⅝"	D2-M	D2-H	1⅜"	2A	1" or 1⅛" powder stick
1¾"	D3-M	D3-H	1½"	3A	1⅛" or 1¼" powder stick
2¼"	D4-M	D4-H	1¾"	4A	1¼", 1½", or 1¾" powder stick
2½"	D5-M	D5-H	2⅛"	5A	1¾" or 2" powder stick, 1⅛" cartridge
3"	D6-M	D6-H	2⅜"	6A	2½" or 2¾" powder stick, 2-5/16" cartridge

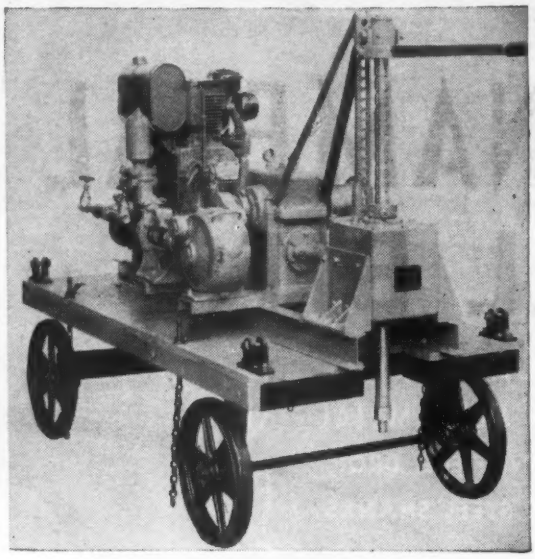
*Supplied in all common operating lengths, or special lengths when desired. Twisted driving shank, on all sizes, is 1⅜" diameter standard O.D. To provide complete interchangeability of augers, adapting sockets are available for application to all common types of drilling machines.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

CORE DRILLING FOR COAL



In coal and mineral prospecting, when maximum core recovery and accurate information is most important ACKER CORE DRILLS are of tremendous value in determining the quality, extent, contour, elevation and uniformity of deposits. Also used to prove depth of overburden in advance of strip mining.

Complete Line of:

Earth Augers—Soil Samplers—Tools and Equipment for Mineral Prospecting and all Subsurface explorations.

SEND FOR LITERATURE TODAY ABOUT QUICKER—LOWER COST CORE DRILLS. TIMKEN EQUIPPED.

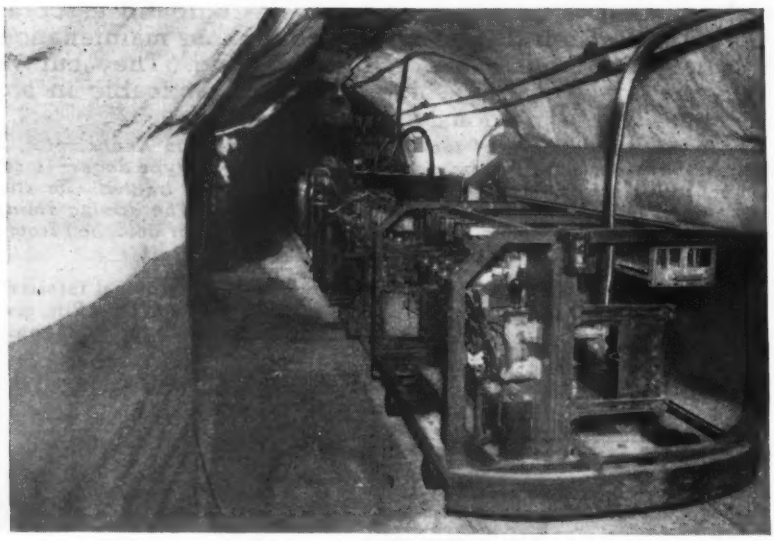
ACKER DRILL CO.

725 W. LACKAWANNA AVE. SCRANTON 3, PA.

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



Above is an underground substation room which is lined with 2" mesh reinforced "GUNITE". Similar uses of plain and reinforced "GUNITE" in haulways and entries are saving money for many coal mines. We do the work or sell the equipment.

Write for our bulletin 2300 today

MANUFACTURERS OF THE "CEMENT GUN"

ington, has been named national distributor for wrought-iron bars manufactured by A. M. Byers Co., Pittsburgh.

PITTSBURGH PLATE GLASS CO. has appointed W. B. Sippey as sales manager of its Columbia Cement Division, Zanesville, Ohio. Chester R. Steenberg has been named as assistant sales manager, with headquarters in Columbus, Ohio.

CLARK MFG. CO., Cleveland, Ohio, hereafter will market its products as "Clark fluid controls" instead of as "Strong steam specialties," as has been its practice for 37 years.

MACK-INTERNATIONAL TRUCK CORP. has appointed Elliott G. Ewell as vice president and manager of its Southern Division, with headquarters at 730 Peachtree St., Atlanta, Ga. He joined the organiation in 1924. His place as manager in Charlotte, N. C., will be taken by L. D. Marshburn.

WILLARD LAWSON CUMMINGS, 71, geologist for the Bethlehem Steel Co. since 1906, died May 15. He was largely responsible for Bethlehem's acquisition of many coal, iron and quarry properties and it was because of his geological work that the large ore body at Cornwall, Pa., was developed.

IRON & STEEL PRODUCTS, INC., Chicago, reports the resignation of A. G. Schroeder, who was connected with its machinery and equipment department.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has appointed J. C. Schaefer as branch office manager at Youngstown, Ohio. Formerly field manager of the Pittsburgh office, he succeeds E. H. Legler, who has been transferred to the electrical department at Milwaukee. L. E. Stacey, field engineer of the Pittsburgh office, has been transferred to Wheeling, W. Va., as a resident field engineer.

ROCKBESTOS PRODUCTS CORP., New Haven 4, Conn., has elected H. O. ("Andy") Anderson, former general sales manager, as vice president in charge of sales.

MACWHYTE CO., Kenosha, Wis., has appointed Fred M. Sims as district sales manager for the Pacific Southwest and William J. Brett as district sales manager for the Pacific Northwest.

FOXBORO CO., Foxboro, Mass., has added Harry D. Wagner to its staff of engineers serving the Cleveland area, with headquarters at 417 Bulkley Building, 1501 Euclid Ave., Cleveland, Ohio.

HOOD REFINING CO., Greensburg, Pa., has appointed Rowe D. Staub as sales manager, with headquarters in Greensburg. Before joining the Hood organization he represented the Pennzoil Co., Oil City, Pa., and more recently was associated with the Seal Power Corp., Muskegon, Mich.

B. F. GOODRICH CHEMICAL CO., Cleveland, Ohio, has appointed T. U. Blake as chief engineer. He will head the company engineering staff serving the Geon resin plants in Niagara Falls, N. Y.; Louis-

BRINGING COAL TO LIFE

FOR MILLIONS of Americans . . . colorful, informative advertising is dramatically portraying the *importance of coal* in their everyday lives . . . showing them how coal and its by-products are needed in war, transportation, agriculture, homes, medicine and other aspects of modern living.

Written in human terms, these advertisements help make the public conscious that coal is their friend . . . that the coal industry contributes to their well-being in countless ways. These messages appear in such widely read magazines as the Saturday Evening Post, Liberty, Life, Atlantic Monthly, Harper's, Nation's Business, Newsweek, U.S. News, National Publisher, and Editor & Publisher.

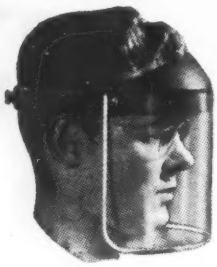
This advertising is part of an even broader campaign by the Bituminous Coal Institute to make friends for the industry and to widen the market for Bituminous Coal. Advertising and publicity directed to the general public is supplemented by special advertisements addressed to home-owners and architects, to industrial users of coal, and to coal dealers and shaped to their special interests.

This public relations campaign, sponsored by mine operators, is part of the unified program for progress within the Bituminous Coal Industry—a program designed to assure the future of every member of the industry. If you are not in on this program, write us today for further information.

BITUMINOUS COAL INSTITUTE

60 EAST 42ND STREET, NEW YORK 17, N. Y.

POPULAR

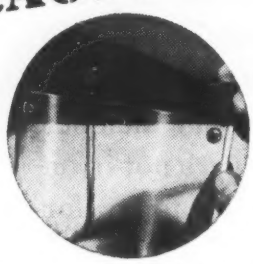


Getting workers to wear safety equipment is a constant problem, especially on "semi-hazardous" jobs such as light grinding, woodworking and spot welding. The Willson Protecto-Shield meets this problem because it combines *new comfort* and *smart appearance* with day-long protection for both front and sides of face and forehead.

COMFORTABLE

Both men and women appreciate these comfort features. Light weight. Tilting visor "stays put" in any position. Plenty of room for spectacles. Clear plastic visor free from optical distortion.

PRACTICAL



Exclusive "Slot-Lock" holds visor securely in place. Can't be jarred loose. Easily replaceable. Three visor-lengths —4, 6 or 8 inch. Two thicknesses—.030 or .060 inch. Two colors—clear or green. Visor and sweatband easily replaceable.

For help on eye protection problems, consult your Willson Distributor or write for information to Dept. CA-10.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

WILLSON

DOUBLE

PRODUCTS INCORPORATED

READING, PA., U.S.A. Established 1870

ville, Ky., and Akron, Ohio, and the company-operated government synthetic rubber plants in Port Neches and Borger, Texas, and Louisville, Ky. F. V. Morrison succeeds Mr. Blake as plant engineer at Port Neches.

RICHARD H. ROWLAND, vice president in charge of the National Battery Co.'s Gould Industrial Division, Depew, has assumed the added responsibility of general sales manager, succeeding John C. Sykora, who resigned to become director of sales, Portable Products Co., New York City.

•

Trade Literature

INDUSTRIAL HARDWARE — Thomas Laughlin Co., Portland, Me. Catalog illustrates, describes, charts and lists prices on drop-forged wire rope and chain fittings. Chart shows at a glance the 14 vital dimensions of hoist hooks, specifying by hook number the safe load and proper size for proof coil and BBB chains, plow-steel and improved plow-steel wire ropes. Similar charts cover swivel hooks, turnbuckles, jaws, eyes, shackles, closed wire-rope sockets and open wire-rope sockets. Another chart gives comparative rope strength with recommended turnbuckle size and type for each size rope.

WELDING—Victor Equipment Co., 844-54 Folsom St., San Francisco. Booklet tells something about the company, the welding industry in general and gives a glimpse into future possibilities.

LUBRICATION—The Texas Co., New York City. April issue of "Lubrication" magazine, entitled "Viscosity and Viscosity Index," tells the value of the viscosity test as a means of estimating the physical ability of a lubricating oil to maintain lubrication under any set of conditions of operating speed, pressure and temperature.

BELT HOOKS—Bristol Co., Mill Supply Division, Waterbury 91, Conn. Bulletin 737 describes new line of wire belt hooks for all types of flat belting; illustrations show method of applying hooks to belts. Specification information and prices also given.

PUMPS—Warren Steam Pump Co., Warren, Mass. Bulletin 238 describes important features of modern duplex hydraulic pressure pumps, forged barrel type, giving specifications. Bulletin 239 covers horizontal duplex plunger pumps for boiler feed and pressure service, pot-valve type with outside end packed plungers.

REINFORCED BUS STRUCTURE—Delta-Star Electric Co., 2400 Block, Fulton St., Chicago 12. Publication 4504 describes and pictures reinforced high-voltage bus structures to withstand short-circuit where currents of several thousand amperes are a possibility.

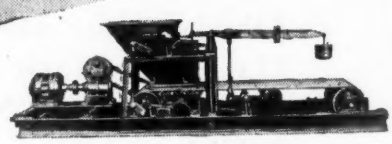
PREVENTING RUSTING—Johnston & Jennings Co., 864 Addison Road, Cleveland 14, Ohio. Bulletin R-181 describes Rusta Restor, the cathodic (electrical) method that is said to prevent rusting of steel water tanks, piping and other steel structures. It illustrates the action with

Relax in Cool Comfort

HOTEL Mayfair Saint Louis

AIR-CONDITIONED

Handle Sizing and Blending of Coal Automatically with the



SCHAFFER POIDOMETER

The SCHAFFER Poidometer automatically proportions, weighs and conveys crushed, granulated, and pulverized coal . . . according to the weights and proportions you want! These units can be used singly or in batteries . . . in pulley centers up to 35′ 0″, thus eliminating extra conveyors and expense. Our Catalog #8 explains the Poidometer in detail. Write for your copy today.

The Schaffer Poidometer Co.

2828 Smallman St.

Pittsburgh 22 Pennsylvania

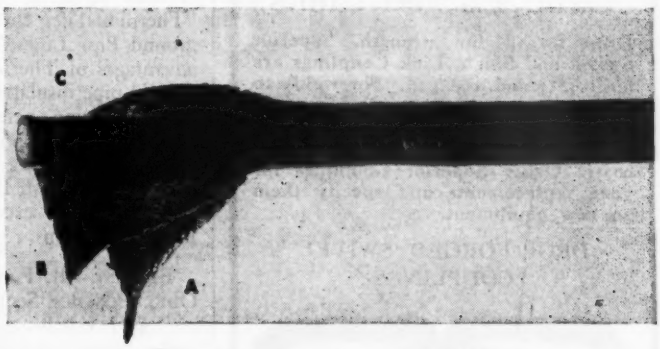
Don't take our word for it —

MAKE THIS SIMPLE TEST AND SEE FOR YOURSELF

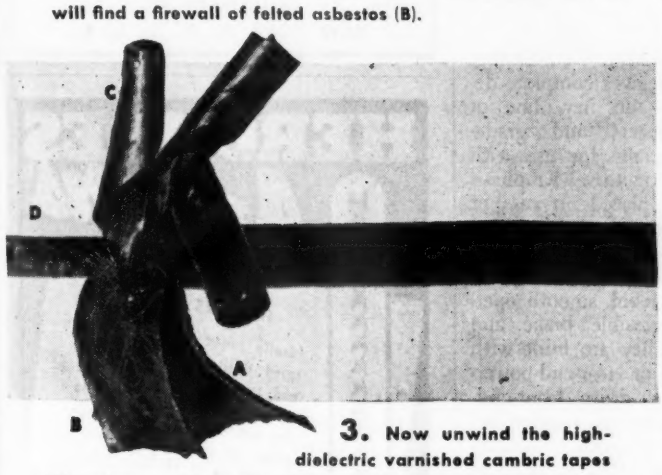
Why PERMANENTLY INSULATED ROCKBESTOS A.V.C.

Gives Long-Lived Service Under Severe Operating Conditions

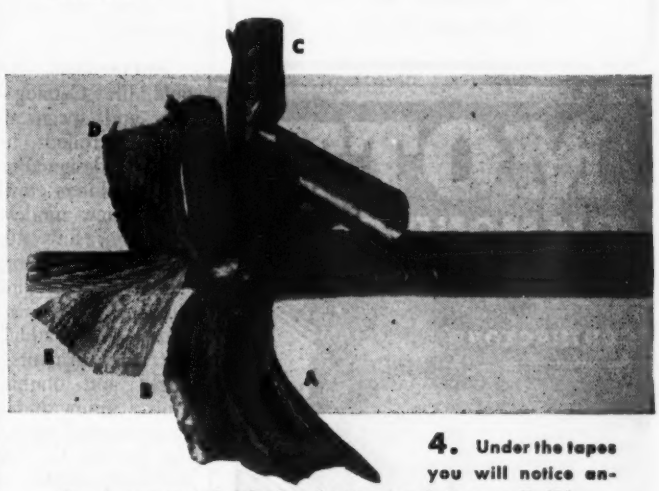
1. Take a sample of Rockbestos A.V.C. 600 Volt Mining Cable, slit open the slick-finished, heavy asbestos braid (A) impregnated with heat, flame and moisture resisting compounds—a braid that won't dry out, crack or flow under heat; won't bloom, swell or rot as a result of contact with oil or grease; and won't burn or carry flame—and beneath it you will find a firewall of felted asbestos (B).



2. Cut through this asbestos firewall (B), impregnated like the braid, but felted into a permanent insulation that is resistant against heat, flame and moisture — an insulation that won't burn, bake brittle or crack with vibration — and next you'll see the lubricated varnished cambric tapes (C) which it protects from high ambient temperatures and oxidation.



3. Now unwind the high-dielectric varnished cambric tapes (C) and you will see the obvious advantages of helical construction — for uniform coverage, for dielectric stability, and to assure, together with the helically applied felted asbestos, perfect and permanent centering of the conductor in the insulation.



4. Under the tapes you will notice another impregnated felted asbestos insulating wall (D), an inner heat-barrier put there to complete the protection of the varnished cambric from the heat of conductor overloads. Slit and peel back this felted wall and beneath you'll find a thin wrapping of paper (E) over the conductor to keep it clean and make stripping easier.

Try the simple test outlined above on a sample of Rockbestos A.V.C. Mining cable, which we will send on request, and you'll readily see why permanently insulated Rockbestos wires, cables and cords resist heat, flame, moisture, corrosive fumes, oil and grease—and give long-lived service under high temperatures and severe operating conditions.

Write:

ROCKBESTOS PRODUCTS CORPORATION
P. O. Drawer 1102, New Haven 4, Conn.

ROCKBESTOS A.V.C.

The Cable With Permanent Insulation

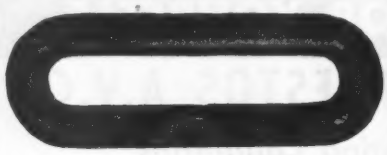
125 different wires and cables have been developed for severe operating conditions by Rockbestos

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.:	Beckley Mach. & Elec. Co.	EVANSVILLE, IND.:	Evansville Elec. & Mfg. Co.	PITTSBURGH, PA.:	Upson-Walton Co.
BIRMINGHAM, ALA.:	Moore-Handley Hdwe. Co.	FAIRMONT, W. VA.:	Fairmont Supply Co.		Westinghouse Elec. Supply Co.
BLUEFIELD, W. VA.:	Superior-Sterling Co.	HUNTINGTON, W. VA.:	Banks-Miller Supply Co.	SCRANTON, PA.:	Penn. Elec. Engineering Co.
CHARLESTON, W.VA.:	Charleston Elec. Supply Co.	LOTHAIR, KY.:	Mine Service Co.	WHEELING, W. VA.:	Westinghouse Elec. Supply Co.
CLEVELAND, OHIO:	Upson-Walton Co.	MIDDLEBORO, KY.:	Rogan & Rogan Co.	WILLIAMSON, W.VA.:	Williamson Supply Co.

FOR VICTORY—GET OUT COAL and INVEST IN U. S. WAR BONDS

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS



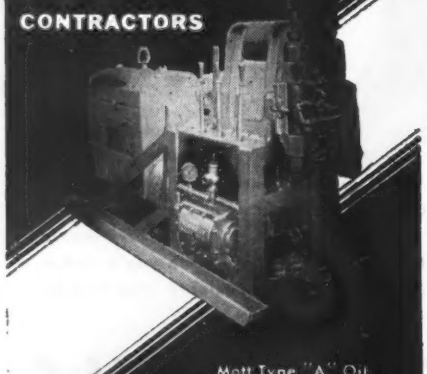
Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH KNIFE & FORGE CO.
1421 Reedsdale St., N.S.
Pittsburgh 12, Pa.

MOTT
DIAMOND CORE DRILLING
CONTRACTORS



Mott Type "A" Oil Hydraulic 1500 Ft. Cap., 2¾" Diameter Core.

• Coal and all mineral properties tested—using our light gasoline drills. They save fuel and moving costs . . . guarantee satisfactory and proper cores.

Pre pressure grouting for mine shafts . . . ground solidification for wet mine areas by our stop grout method. Water wells and discharge holes drilled and grouted . . . electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

simple experiments, describes the equipment, includes a table of comparative costs, etc.

WATER HOSE—B. F. Goodrich Co., Akron, Ohio. Catalog Sec. 4800 contains data and sizes, number of plies, weight per hundred feet, outside diameters and working pressures of water hose for industrial plants. Construction of the three types of products in this line is described.

UNDERGROUND PIPE CONDUIT—H. W. Porter & Co., 825 Frelinghuysen Ave., Newark 5, N. J. Bulletin 451, entitled "Therm-O-Tile, the Conduit for Underground Pipe Lines," covers the four main advantages of Therm-O-Tile: keeps underground pipe insulation dry; holds the grade of the piping permanently; has greater strength than required by the American Society for Testing Materials; is competitive in initial cost. It shows a modified design for use in exceptionally wet or submerged locations.

BELTING—B. F. Goodrich Co., Akron, Ohio. Catalog Sec. 2186 points out that open-end V-belting helps insure efficiency and economy on many drives where use of endless V-belts is not practicable. Line-shaft and similar drives can be utilized by using this type belting and fasteners. Rules for its successful application are given, including the method to determine pitch length, allowances for fastener length and for tension. Limitations of this type installation are outlined and the fasteners described.

BULLDOZERS—Baker Mfg. Co., Springfield, Ill. Catalog 849 gives complete details and specifications on new line of cable-controlled bulldozers and grade-builders designed especially for use with Allis-Chalmers crawler tractors. Emphasis in the new models is placed on ease of operation, low maintenance and adaptability to field conditions. They feature self-energizing, air-conditioned cone-type clutches and brakes for cool, smooth operation, and readily accessible brake and clutch adjustments. They are built with single- and double-drum rear-end-power-control units and single-drum front-end-power-control units. A special trunion design permits the blade on both bulldozers and grade-builders to be tilted as much as 12 in. at either corner, increasing their usefulness for crowning, ditching and grading.

PIPE OUTLETS—Bonney Forge & Tool Works, Dept. 210, Allentown, Pa. "Handbook of Branch Pipe Outlets," a pocket-sized manual for men responsible for piping, illustrates and explains the four simple steps in installing full pipe-strength outlets by the WeldOlet method. Also illustrates the tools needed to make the joint, the three types of WeldOlet fittings available for butt-welded, threaded and socket-welded branch pipes, and shows typical installations.

TACHOMETERS—General Electric Co., Schenectady, N. Y. Bulletin CEA-4324 tells how to select tachometer equipment, with features and advantages; describes G-E units and gives ordering directions.

DIESEL ENGINES—Caterpillar Tractor

QUALITY MARLO PACKING

METALLIC & SEMI-METALLIC
PACKING
for
MINE PUMPS
"The Packing that gets the Repeat Orders"

For deep mine pumps. Resists acid mine waters. Keeps grit out of stuffing box. Three types.

• MARLO ALL PURPOSE METALLIC PACKING

Best ever devised. Will not freeze at 70° below, soft, pliant, like fibrous types, yet easier to handle. Won't cut, score or corrode moving parts.

• "TWIN-TWIST" SEMI-METALLIC PACKING

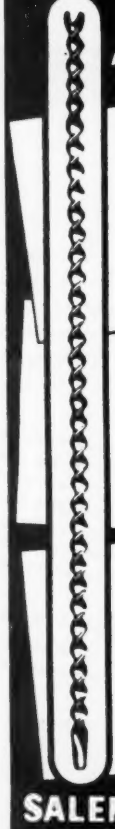
Metal strands twisted with asbestos. Anti-frictional. Durable. Economical. Remarkable compressibility. Never hardens. For temperature up to 550° F.

• "RED WATER" SEMI-METALLIC PACKING

Most modern development for all hydraulic applications. A solid - packing vegetable fibre combined with metal strands. Retains form under any conditions.

Let us serve you
THE MARLO COMPANY
38 HOWARD ST.
NEW YORK, N. Y., U. S. A.

HERCULES Augers



HERCULES AUGERS
Ideally suited to modern high speed drills – withstand whips and torsional strains. May be resharpened – outlast four to five ordinary drills. Sizes available up to 3" diameters – lengths up to 16 ft.

BLACK DIAMOND AUGERS
Made from high-carbon crucible grade steel – heat treated to insure as much toughness and hardness as possible and to prevent broken tangs and points. Available in diameters up to 2" – maximum over-all lengths, 16 ft.

STANDARD AUGERS
Developed originally for use with hand drills. These augers recommended for hand drilling, drilling under stumps and ditch blasting. Diameters up to 2" from oval steel, 7/16" thick, maximum length ten feet.

SALEM TOOL COMPANY
SALEM OHIO

5 Years OF RELIABLE SERVICE

and

NO MAINTENANCE *for this* 1000 G.P.M. WARREN PUMP

"Our Warren 1000 G.P.M. pump was installed five years ago, and handling very acidulous water, has operated to date with no expense for maintenance or repairs," writes the superintendent of a well-known bituminous coal company. "Its present condition is excellent and we do not hesitate to recommend Warren Pumps highly for dependability and low operating and maintenance costs."

AND HERE ARE SOME OF THE REASONS WHY USERS RECOMMEND WARREN PUMPS:

CORRECT MATERIALS

Standard Warren Pumps have iron casings with bronze impellers, shaft sleeves, case rings, and glands. Pumps can be furnished with all parts coming in contact with liquids made of acid-resisting bronze or chrome steel alloy.

SMOOTH PERFORMANCE

Impellers are accurately balanced, insuring vibration-free performance. Shafts are finished by grinding and made exceptionally heavy to prevent deflection.

NON-CLOGGING

Water passages are correctly and liberally proportioned to handle suspended solids without trouble.

LONGER LIFE

Low velocities mean less wear on casings.

REDUCED MAINTENANCE

Bearings are of the split shell, heavy duty, ring-oiling type or full ball bearing. Labyrinth case wearing rings; water-sealed, deep stuffing boxes and split packing glands are used.

GREATER ACCESSIBILITY

All interior parts are readily accessible without disturbing piping.

Warren Pumps installed on de-watering services in the bituminous fields of Pennsylvania and West Virginia alone are discharging to the surface approximately 75,000,000 gallons of water per day on heads varying up to 500 feet. Follow the example of many Warren-equipped mines and take advantage of the savings Warren Pumps make possible.

FOR LONGER LIFE AND GREATER DEPENDABILITY

WARREN STEAM PUMP CO., INC.

WARREN, MASSACHUSETTS

PROFESSIONAL SERVICES

ALLEN & GARCIA CO.
ENGINEERS AND BUILDERS OF MODERN COAL OPERATION
Authoritative Valuations, and Reports of Mining Properties Equipment and Operation.
332 S. Michigan Ave., Chicago
120 Wall Street, New York, N. Y.

HAROLD G. BURRILL
AND ASSOCIATES
Registered Professional Engineer
Power Plants, Mine Ventilation,
Haulage and Drainage
Mine Mechanization
Temporary Address: Quarters 56,
Aberdeen Proving Ground, Md.

EAVENSON & AUCHMUTY
Mining Engineers
Coal Operation Consultants
Valuations
Koppers Bldg. Pittsburgh, Pa.

J. H. FLETCHER
30 Years
Continuous Consulting Service
to Coal Mines
Telephone Harrison 5151
McCormick Building Chicago, Illinois

T. W. GUY
COAL PREPARATION
To Yield Maximum Net Returns
Face and Product Studies
Plant Design and Operation
Coal Sampling
Kanawha V. Bldg. Charleston, W. Va.

C. C. MORFIT & ASSOCIATES
Consulting Engineers
Reports, Valuation, Construction,
Operation, Management
11 Broadway, New York 4, N. Y.

McNEIL & McNEIL
Engineers
179 W. Washington St. Chicago 2

SHERWIN and JANVRIN
Mining Engineers
Pineville, Ky.
Reports on COAL PROPERTIES
Planning, Construction & Supervision

L. E. YOUNG
Consulting Engineer
MINE MECHANIZATION
MINE MANAGEMENT
Oliver Building—Pittsburgh, Pa.

Co., Peoria 8, Ill. Bulletin Form 8932 describes how the need for low-cost dependable power in mine and mill operations has been met by diesel power in the form of industrial and electric sets said to be outstanding for their low cost of operation, ability to operate on a wide range of low-cost fuels and in-built long life. Pictures show these engines at work in a wide range of operations.

STEEL—American Brake Shoe Co., American Manganese Steel Div. Bulletin 1144-NM describes typical applications of Amsco Manganese steel where freedom from magnetism in addition to the ability to withstand shock and wear was decisive in its selection.

LEATHER PACKING—Chicago Belting Co., Chicago 7. New handbook contains sketches and comment on the design and application of replacement hydraulic and pneumatic leather packings as well as dimensional standards.

DEFENSE PLANT CLEARANCE—A. B. Dick Co., Chicago 6. Special die-impressed mimeograph stencils simplify production of the various papers required in the defense plant clearance program. Details of the use of these stencils and an explanation of the procedure established by D.P.C. engineers is covered in an illustrated folder entitled "Mimeograph Brand Die-Impressed Stencils for the Production of Defense Plant Clearance Papers," which is available upon request from A. B. Dick Co.

PUMPS—Fairbanks, Morse & Co., Pomona, Calif. Publication AQB400.1 cites the outstanding features and advantages of Figure 6920 oil-lubricated turbine pumps with inclosed impellers. Publication AQB500.1 covers the low-lift large-capacity line known as Niagara propeller pumps.

MAGNETIC EQUIPMENT—Stearns Magnetic Mfg. Co., Milwaukee 4, Wis. Folder describes the application of magnetic pulleys, suspended magnets and spout magnets for removing tramp iron and metallic junk automatically and economically from coal flow.

TURBINES AND PUMPS—DeLaval Steam Turbine Co., Trenton 2, N. J. Catalog 1181 is devoted to the company's complete line of steam turbines, helical gears, centrifugal pumps, centrifugal compressors, worm gear speed reducers and IMO oil pumps.

FRICTION MATERIALS—Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. New catalog describes extensive line of friction materials, including woven, folded and compressed, molded, semi-metallic and full metallic, each made in a number of types and structural modifications to suit the specific needs of industrial equipment.

STORAGE BATTERIES—Philco Corp., Storage Battery Div., Trenton, N. J. Manual summarizes information on all the various industrial applications of storage batteries, including a wide range of facts running all the way from the proper method of operating and maintaining batteries in the tropics to how best to preserve the life of a battery when not in use.

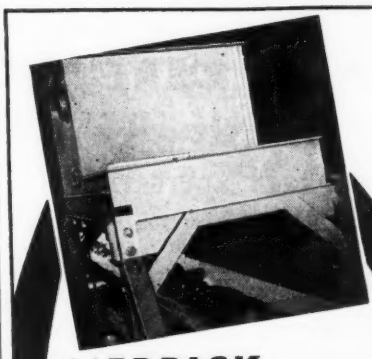
TORNADO
PORTABLE ELECTRIC BLOWER
reduces
DUST DANGER

BLOWS clean, dry air, at 295 m.p.h. Cleans out motors, generators and hard-to-get-at places—removing dust, dirt, lint and chips. Costs less than 3c an hour to operate. Reduces damage to motors and bearings—lessens fire and health hazards.

1 H.P. universal G.E. motor. Weight, 14 lbs. Portable to any place in plant. Plugs in at convenient outlets. Adaptable as Sprayer for spraying paint and insecticide. Convertible into powerful industrial Vacuum Cleaner—for cleaning floors, walls, ceilings, etc.

Free Trial—Write to
BREUER ELECTRIC MFG. CO.
5098 N. Ravenswood Ave., Chicago 40

TAKE THE DUST OUT OF DUSTY
TORNADO
PORTABLE ELECTRIC BLOWER



MERRICK WEIGHTOMETER

While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER keeps a continuous and accurate record of weights. Total weight is available at a glance.

Applied to any size belt conveyor, either horizontal or inclined. The weightometer gives a simplified and dependable record of your production, without interrupting the flow of coal.

Write for Bulletin 375

MERRICK SCALE MFG. CO.
PASSAIC, N. J.

Balanced

FOR BETTER, SAFER DRILLING IN RAISES AND "ROCK HOLES"

Perfect balance . . . easy handling . . . that's why drill runners like the Gardner-Denver R-104 Stoping Drill. The R-104 is not nose-heavy . . . it actually feels lighter than it is, due to its perfect balance.

It's a safe stoper, too! The operator has complete control of the drill at all times . . . can maintain his balance even on precarious footing. There's no pull on the holding handle of this stoper . . . the drill, not the drill runner, fights a tight bit.

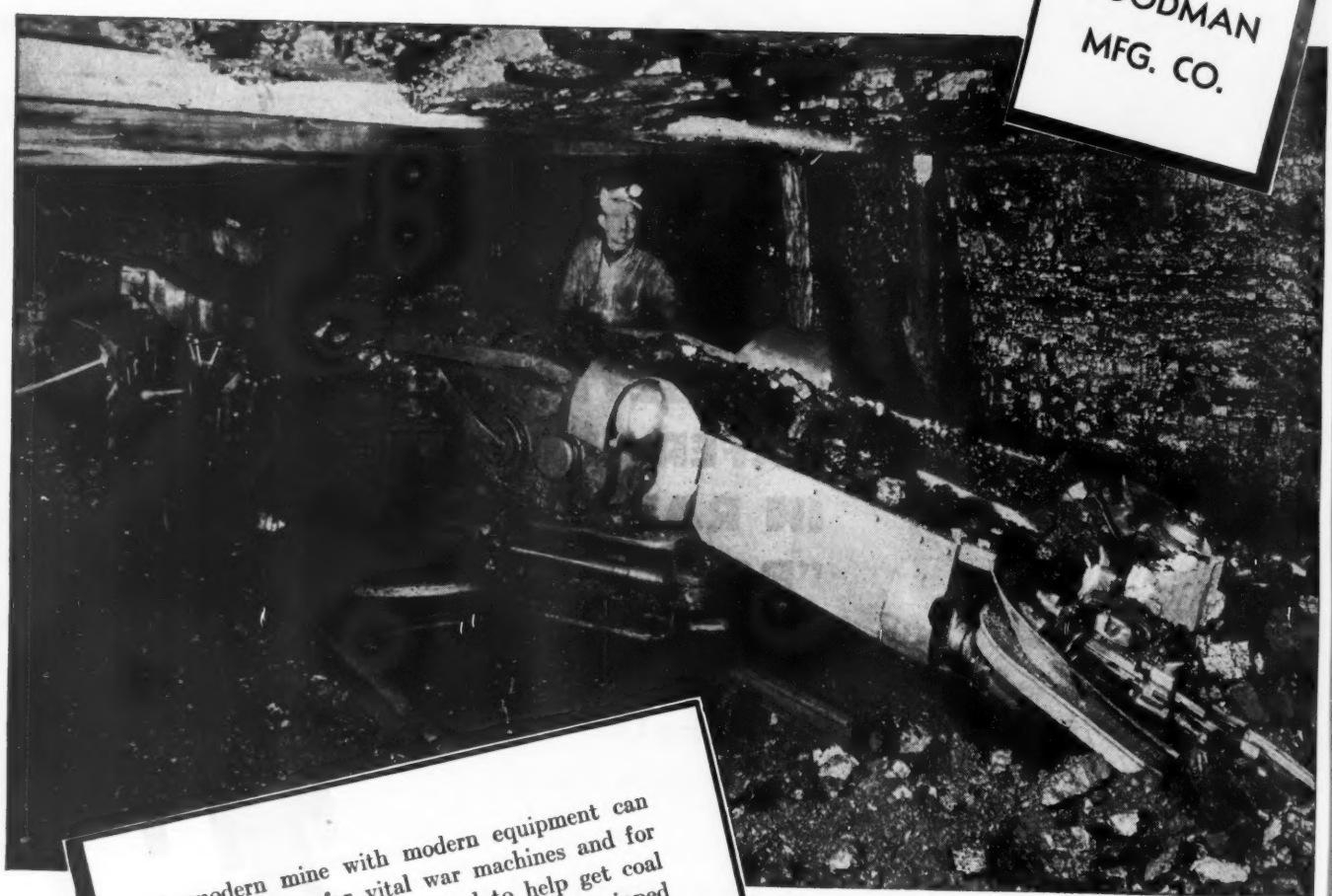
The R-104 has plenty of power for drilling in the hardest rock. Its automatic self-cleaning system prevents the entrance of water or sludge into the drill . . . assuring long life and low maintenance. The R-104 stays underground . . . rarely comes up for repairs.

For complete information on Gardner-Denver "better balanced" stopers, write for descriptive bulletins. Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER *Since 1859*

MODERN LOADERS USE MODERN BEARINGS

Built by GOODMAN MFG. CO.



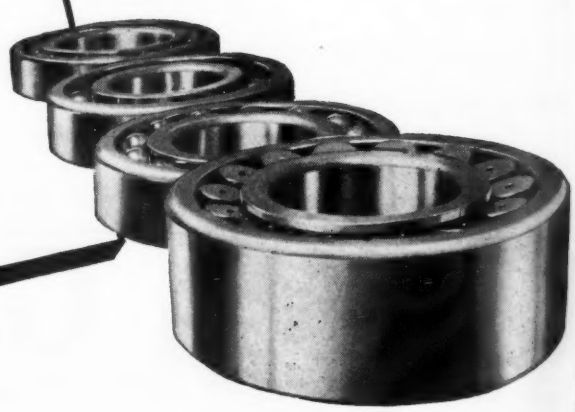
A modern mine with modern equipment can supply energy for vital war machines and for important by-products. And to help get coal from working face to car are SKF-equipped machines like this Goodman Type 460 Loader that's clearing up a fall. On the chain conveyor head, tail shafts and other turning parts of this loader, SKF's perform smoothly and continuously . . . absorb radial and thrust loads . . . never need adjustments. The simple statement "SKF-equipped" is sufficient to explain the good performance of any machine . . . anywhere.

5818

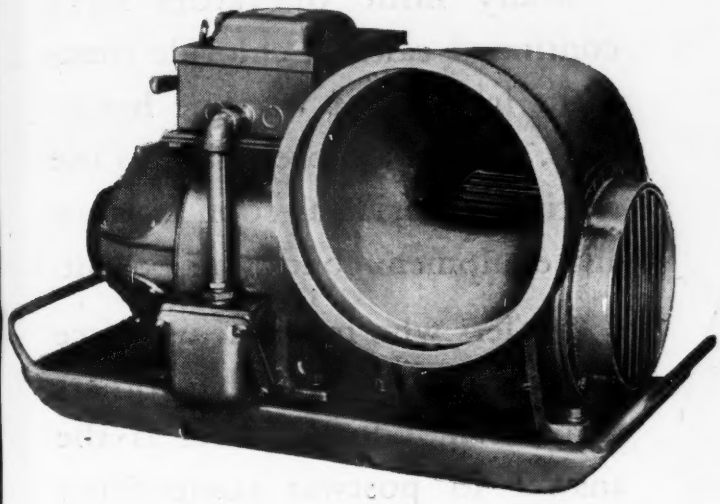
SKF INDUSTRIES, INC., PHILA. 34, PA.

SKF

BALL AND ROLLER BEARINGS



For Maximum Tonnage It's THE BROWNIE Car Spotting Hoist



For Auxiliary Ventilation It's THE BROWNIE Tubing Blower

CAR SPOTTING HOISTS by Brown Fayro are made to suit various conditions of load, loading rate, and bringing in empties . . . give you maximum tonnage with minimum operating costs.

Illustrated is Model HKD, rated at 12,000 pounds normal rope pull . . . used where loaded trips are of the size hauled by 15 ton or larger locomotives.

Standard features of Model HKD Hoist include complete guarding of all working parts . . . high efficiency spur gearing . . . automatic mechanical brake to hold the load . . . bevel jaw clutch to disengage the rope drum . . . snubber brake to prevent overtravel of the drum when pulling off rope.

There's a long line of Brown Fayro car spotting hoists. Write today for complete information.

The "BROWNIE" MODEL BC BLOWER is particularly suited for auxiliary mine ventilation because it is compact, will stand rough usage, and is capable of delivering ample volume of air through long lengths of tubing.

Boat type base permits easy handling, and the size and low center of gravity make it possible to locate the unit in any convenient place. The fan-casing is of corrosion-resisting semi-steel, and the impeller is of the centrifugal multiblade type for high efficiency and quiet operation. The blower outlet is arranged for connection to 12" diameter flexible tubing.

Blowers can be furnished with standard or explosion-proof electrical equipment. It will pay you to investigate today the many advantages of the Brownie Blower. Write for details.

Other Brown-Fayro Products: Room Hoists, Rigging Hoists, Gathering Pumps, Layer Loading Hoists, Car Retarders, Sheaves and Rollers, Rerailers and Derailers.

THE BROWN-FAYRO COMPANY

JOHNSTOWN, PENNA.

"Send Calcium Chloride Treated—
CLEAN, DUSTLESS COAL."

When housewives phone for coal, give them the kind of coal they want — the kind that makes lifetime customers — clean, dustless and ODORLESS coal treated with calcium chloride.

Many mine operators have continued calcium chloride treatment in spite of wartime handicaps. Others are preparing to use calcium chloride as soon as labor and equipment conditions permit.

Dealers who meet the user face to face know better than others that clean, odorless coal is the answer to postwar competition with other fuels.

Write for our Bulletin No. 37 and be the early bird in the coming competitive market. Use this lure to boost sales — Coal treated at the mine with calcium chloride.

CALCIUM CHLORIDE ASSOCIATION

4145 Penobscot Building Detroit 26, Michigan

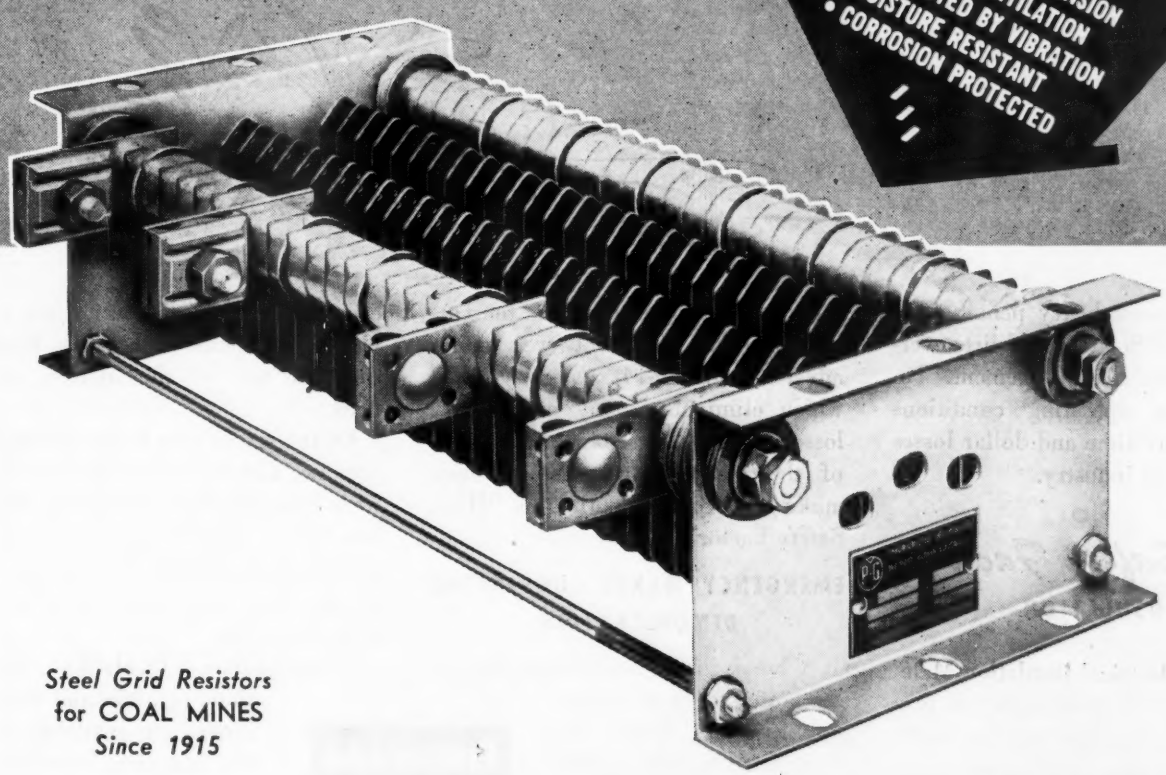
DUSTPROOF COAL AT THE MINES WITH

CALCIUM CHLORIDE

WHERE THE GOING IS TOUGHEST

use P-G *Nonbreakable* *Steel Grid Resistors*

- ALL STEEL CONSTRUCTION
- MICA INSULATION
- RUGGED TERMINALS
- PROVISION FOR EXPANSION
- ADEQUATE VENTILATION
- UNAFFECTED BY VIBRATION
- MOISTURE RESISTANT
- CORROSION PROTECTED



Steel Grid Resistors
for COAL MINES
Since 1915

POST-GLOVER Steel Grid Resistors use steel and mica as basic materials to create continuous trouble-free resistor service. These materials and the unique P-G features of design provide a resistor capable of meeting the toughest of operating conditions. Neither vibration, moisture nor corrosive atmospheres have material effect on quality of service. Always specify P-G . . . . . .

P-G

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1892 •

221 WEST THIRD STREET, CINCINNATI 2, OHIO

Do your motors pay a Moisture Tax?

Moisture imposes heavy penalties on many motors. So do heat, dirt, overloads and the human element. Together, these operating conditions cause excessive time and dollar losses in nearly every industry.

HIGH *Safety Factor* INSULATION

Fiberglas* Electrical Insulation Materials have proved their ability to provide "extra" protection against conditions which cause most motor burnouts and failures.

Take moisture resistance, for example. The individual Fiberglas fibers do not absorb moisture. They will not swell or disintegrate or become chemically affected by oils, most corrosive vapors or acids. Therefore, Fiberglas retains its strength, supports the varnish insulating element even under adverse conditions. It is a *safety factor* which eliminates many unnecessary losses. Moisture resistance is but one of the many characteristics which make Fiberglas Insulation "High Safety Factor" Insulation.

EMERGENCY MAKES CONVINCING DEMONSTRATION

A break in the main steam line, in the boiler room of a large public utility, filled the room with live steam. Six 700 hp. induction motors were located in the room to supply air to the main boilers. It was feared that the steam and heat would knock out all of the motors. Fortunately, however, the plant engineer had previously specified Fiberglas Insulation for two of the motors, as a trial.

Of the six motors in the room, the only two which did not fail were those with Fiberglas-base Insulation. These two motors kept the generating plant in operation, at reduced capacity, until the other four could be rewound with Fiberglas.

Fiberglas-base Insulation Materials, in plain and treated forms, are available *now*. For complete information consult your distributor or write for new catalog. *Owens-Corning Fiberglas Corporation, 1862 Nicholas Building, Toledo 1, O.*

In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.

ASK FOR FIBERGLAS—IN YOUR NEXT NEW MOTOR—AND ON YOUR NEXT REWIND

FIBERGLAS

*T. M. Reg. U. S. Pat. Off.

ELECTRICAL INSULATION MATERIALS

ARMY E NAVY

THERE'S A COMPLETE LINE OF FIBERGLAS ELECTRICAL INSULATIONS

YARNS • TAPE • CORD • SLEEVING • CLOTH AND OTHER FORMS. Also available in: Magnet wire, Lead wire, Special wires, Varnished cloth and tape; Mica combinations: Laminates, Saturated sleeving, Varnished tubing, Pressure-sensitive tapes, Special products.

OHIO

PA.

Legend

▲ CHANCE WASHER

◉ CITIES

INSTALLED in this section of America's most productive coal belt are 23 CHANCE PROCESS coal washers, many of the installations representing *REPEAT ORDERS* for the Process. These repeat orders are evidence of the satisfactory performance of CHANCE.

PITTSBURGH

JOHNSTOWN

WHEELING

FAIRMONT

MD.

W.VA.

CHARLESTON

HUNTINGTON

RICHWOOD

VA.

LOGAN

KY.

PIKEVILLE

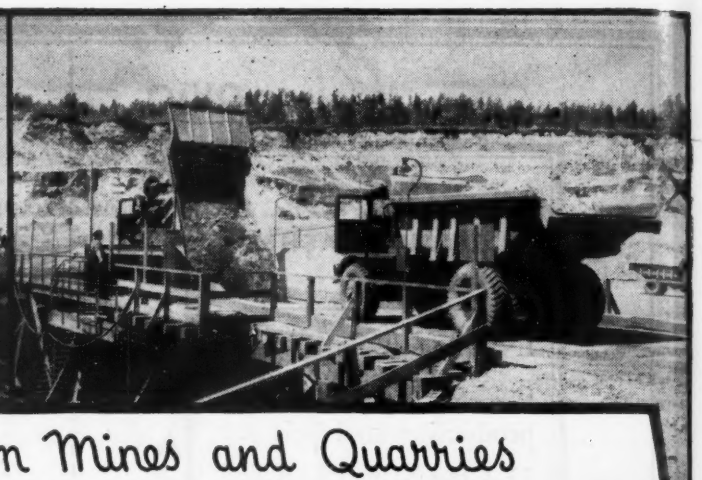
BLUEFIELD

TENN.

N.C.

UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK PHILADELPHIA CHICAGO



In Mines and Quarries

EUCLIDS

move thousands of EXTRA tons every month

● Built for tough off-the-highway hauling, Rear-Dump and Bottom-Dump EUCLIDS have stepped up production noticeably and reduced hauling costs on scores of open-pit mining and quarry operations. Here are some of the more important reasons for the *plus* performance of Euclids:

Rugged simplicity — Designed for dependable performance as well as appearance, there are fewer wearing parts; maintenance costs and down-time for repairs are reduced to a minimum.

Capacity — Euclid models have payload capacity ranging from 15 to 30 tons; favorable ratio of unit weight to payload capacity means more pay tons hauled on every trip.

Speed — top speeds loaded of 21.8 to 34.4 m.p.h., depending on model; fast travel time results in many more pay load trips per hour than can be made with slower equipment.

Versatility — Efficient for hauling any material on any length haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer bins, mobile loaders and other modern digging and loading equipment.

If you are interested in increasing your production and profits, check Euclid performance on any job, and write for complete information.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH ROCK COAL ORE

EUCLID THE PIONEER

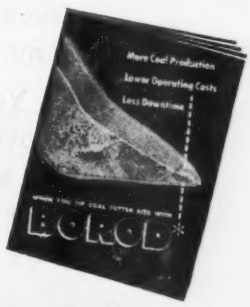
Here's "DIAMOND-LIKE HARDNESS" for coal cutter bits

BOROD increases bit life up to 8 times on regular or throw-away types

TO WITHSTAND the intense wear of cutting coal and to *retain sharpness* of points, apply BOROD to tips of all coal cutter bits. It's surprising how little BOROD is required to obtain maximum increase in bit life—in fact *one pound* of BOROD brings this wear protection to as many as *4000 bits!*

With easily made jigs a good welder can hard-face an average of *450 bits per hour* with oxy-acetylene equipment, hard-facing costs total only a fraction of a cent per bit. BOROD keeps bits on the machine during an entire shift, saves down-time for bit changes and cuts several times more kerf than heat-treated bits. Used by mine operators in all parts of the United States.

WHY NOT TRY 5 LBS. OF BOROD TODAY?
Costs only $5.50 per lb. in ⅛" x 14" rod sizes, f.o.b. distributors' warehouse or Whittier, California. Available from over 600 U.S. distributors.

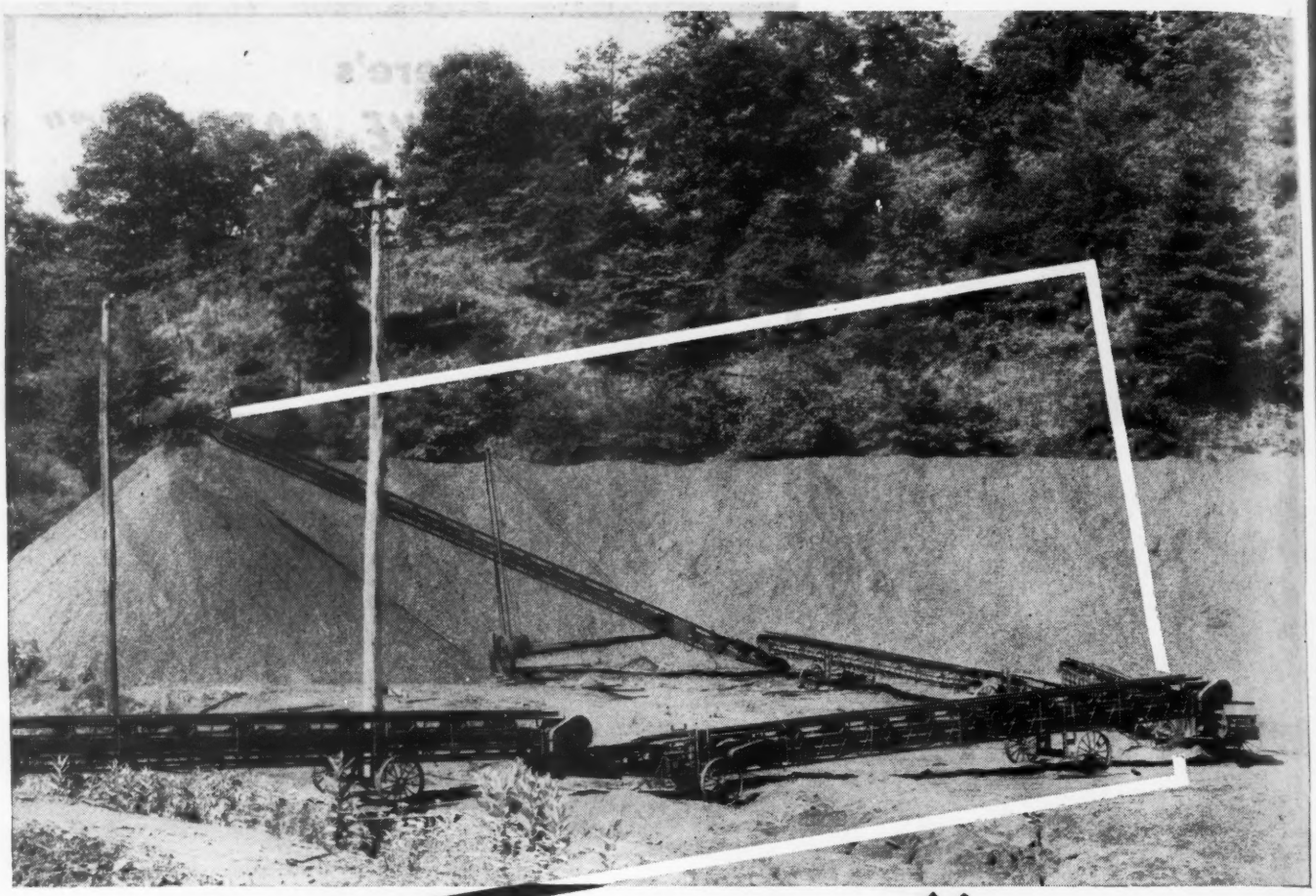


This Free Folder Gives Complete Borod Story.
Shows correct oxy-acetylene flame adjustment for application, welding jigs and economy advantages. Write for your free copy today!

Stoody Company, 1143 West Slauson Avenue, Whittier, California

STOODY HARDFACING PROLONGS LIFE OF ALL WEARING PARTS
Over 25 commonly used pieces of coal mining equipment can be hard-faced with Stoody Alloys and made to last from two to ten times longer. Write for information on how to prolong life of your conveyors, crushers, cutter chain lugs and straps, loaders, dipper parts, etc.

STOODY HARD-FACING ALLOYS
Retard Wear Save Repair



HOW B-G CONVEYORS STEP UP PROFITS

• Moving coal continuously . . . that's how Barber-Greene Portable Conveyors can save money for you.

These teamed-up B-G Conveyors can pile huge quantities in a limited space in a short time. No trick to extend them to awkward, cramped corners . . . maneuver them into almost any angle or position quickly.

You have separate units that can be moved from place to place in a hurry for a multitude of conveying jobs . . . that can be used for fast reloading of cars when the time comes.

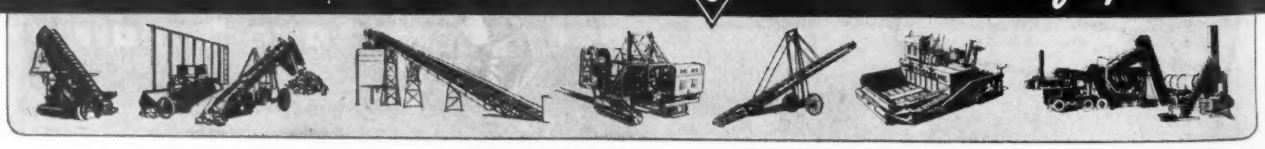
Because B-G Conveyors are made from standardized sectional units, additions and alterations are easily made. Investment in equipment is small. Maintenance and operating expense are low.

There is pre-engineered B-G conveying equipment for every type of mine haulage. B-G mining engineers will be glad to help you solve your material handling problems.

Write for Mine Catalog 66 describing underground conveying equipment, stackers, loaders and unloaders. Barber-Greene Company, Aurora, Illinois.

45-60

Barber-Greene B G *Constant Flow Equipment*



Page *Automatic* Buckets DIG DEEPER

The real test of a dragline bucket's efficiency is its ability to dig not just up a slope, but at the bottom of the pit. AUTOMATICALLY poised for digging, Page buckets ALWAYS land with all weight on the teeth . . . bite right in at first pull of the load line regardless of how deep the digging may be!

PAGE
Automatic
DRAGLINE BUCKETS

PAGE ENGINEERING COMPANY, CHICAGO 38, ILLINOIS

4 Driving Wheels and 28 Trailing Wheels Hauling 160 ton 40 M.P.H.

Differential Trains

(PATENTED)

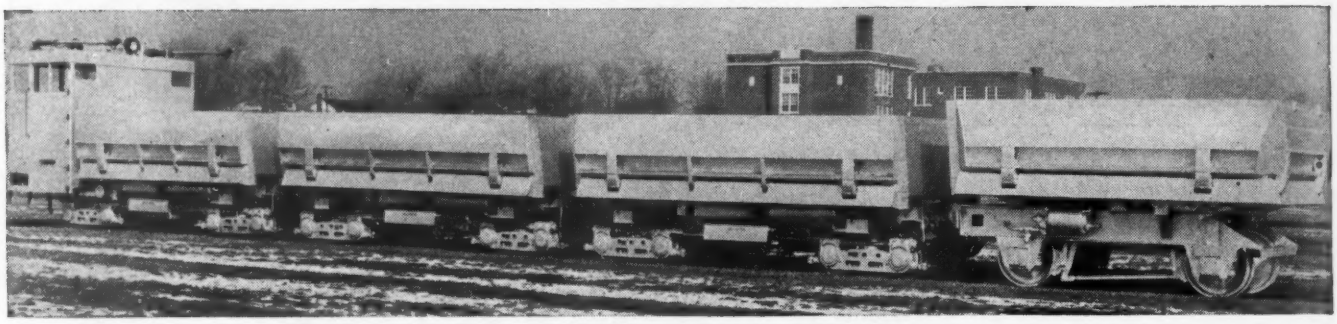
LOWEST FIRST COST—Per Ton Mile Hauled

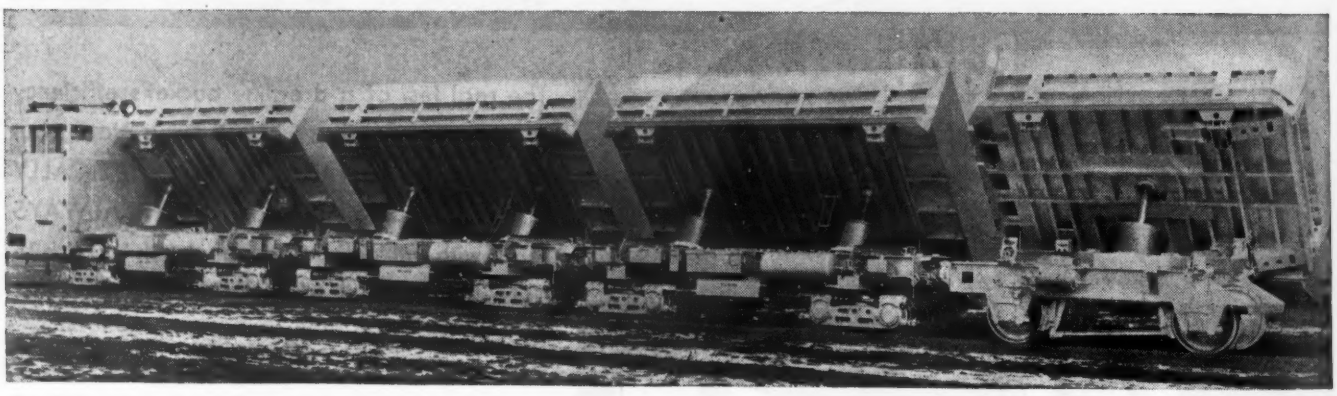
LOWEST OPERATING COST—Per Ton Mile Hauled

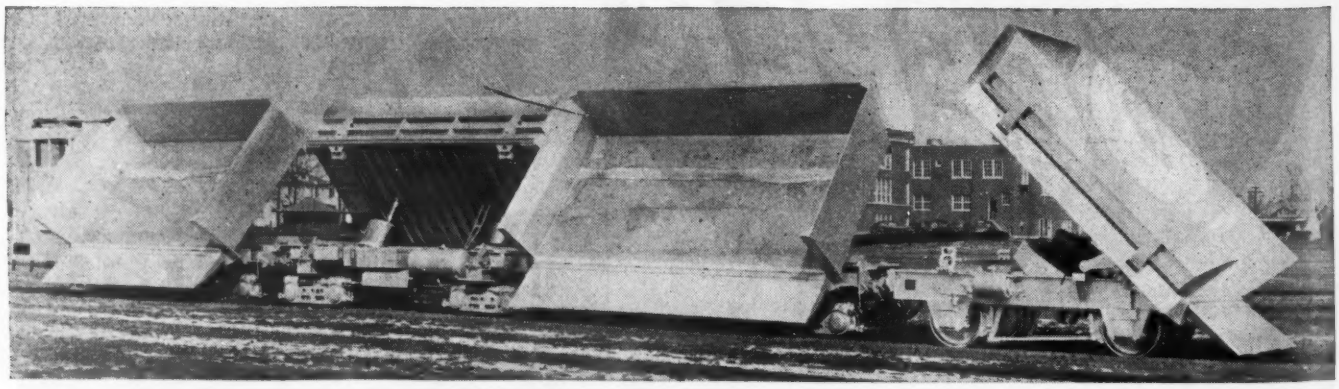
Designed and Built by

DIFFERENTIAL STEEL CAR CO.

FINDLAY, OHIO

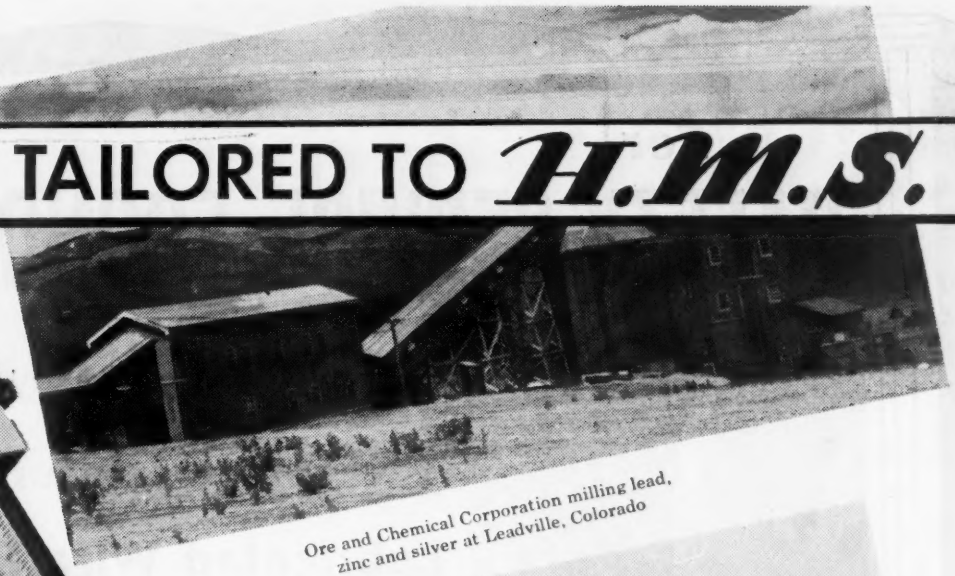




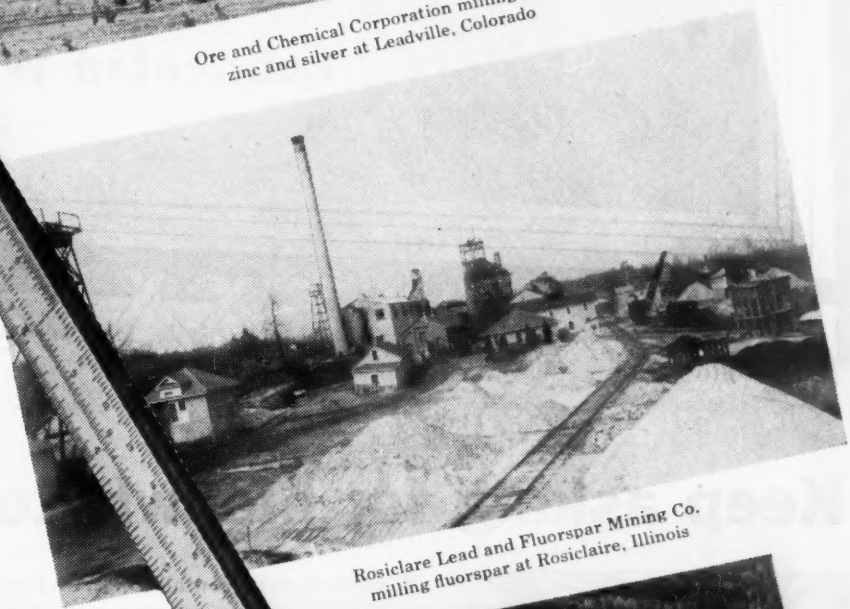


24 Driving Wheels and 4 Trailing Wheels Hauling up 10 % grade 11 M.P.H.

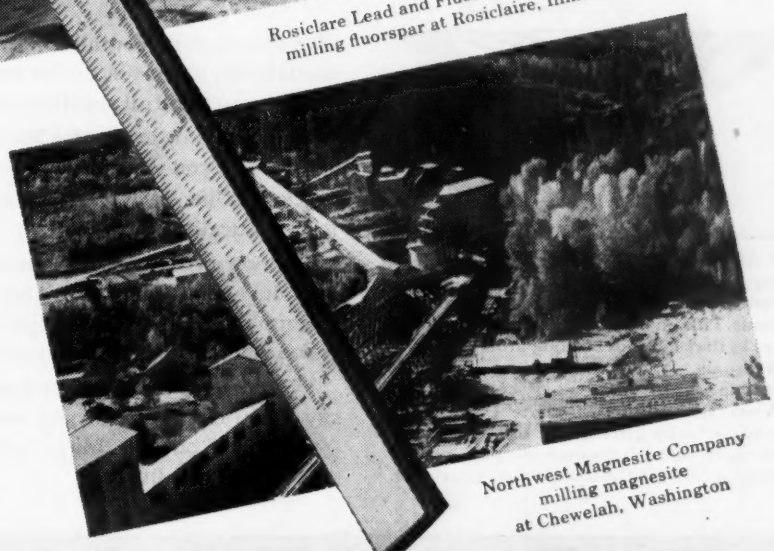
TAILORED TO *H.M.S.*



Ore and Chemical Corporation milling lead, zinc and silver at Leadville, Colorado



Rosiclare Lead and Fluorspar Mining Co. milling fluorspar at Rosiclaire, Illinois



Northwest Magnesite Company milling magnesite at Chewelah, Washington

WEMCO HAS EQUIPPED MORE HEAVY-MEDIA SEPARATION PLANTS THAN ANY OTHER MANUFACTURER

If you intend to use Heavy-Media Separation for more economical processing of surface coal, you are offered the advantage of Wemco's specialized equipment experience. The teamwork of this process and Wemco HMS equipment has increased the efficiency and output of plants in varied fields throughout the U. S.

Offered as working proof of this team in action is the high delivery of the plants illustrated on this page. For security reasons the exact output of these plants cannot be told, but in every case they exceed their original estimate.

For projecting the results of your proposed HMS plant Wemco offers its HMS Laboratory Unit for batch testing or continuous testing up to 500 pounds per hour.

HMS EQUIPMENT BY WEMCO:

- SEPARATORY SCREWS
- SEPARATORY CONES
- DENSIFIERS
- SPECIAL THICKENERS
- MAGNETIZING BLOCKS
- GLANDLESS SAND PUMPS
- SOLENOID GATES
- SPECIAL MEDIA SEPARATING HOPPERS
- 20" HMS LABORATORY UNIT

1011

WEMCO

WESTERN MACHINERY COMPANY

760 FOLSOM STREET, SAN FRANCISCO 7, CALIFORNIA

LOS ANGELES • SACRAMENTO • SPOKANE • SALT LAKE CITY • PHOENIX • DENVER • NEW YORK • WASHINGTON, D.C.

AGITATORS • SAND AND DIAPHRAGM PUMPS • FEEDERS • CLASSIFIERS
HYDROSEPARATORS • THICKENERS • TABLES • H M S EQUIPMENT

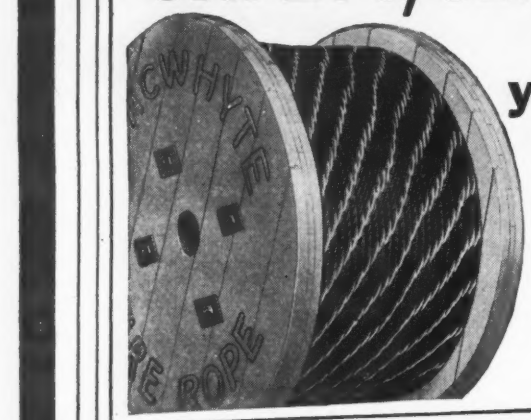
For

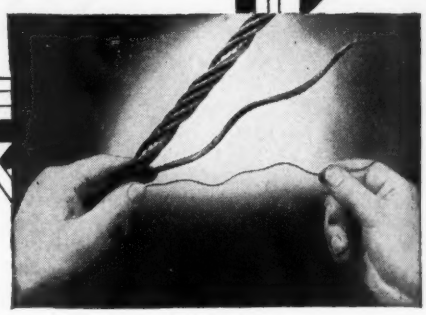
SAFETY, SERVICE, ECONOMY,

you can't beat Macwhyte

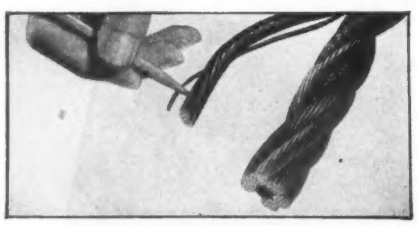
PREformed, Internally

Lubricated Wire Rope!





Keep asking for Macwhyte PREformed!



All Macwhyte PREformed Wire Rope Is Internally Lubricated! Macwhyte Wire Rope Lubricant is packed around each wire in all strands. This improves the sliding action of the wires as they move in bending around sheaves and drums. It also protects against inside corrosion.

When you select Macwhyte PREformed you are not only getting "the correct rope for your equipment," but also a personal interest in helping you get the most out of your rope.

Today a large percentage of Macwhyte PREformed Wire Rope is serving on the battlefields, in the air, on the sea and in essential industry. For this reason there is not enough to fill all requirements.

But don't stop asking for Macwhyte PREformed! Quite often it *is* available, and *when* it is, you get a rope with less internal fatigue, less friction, better balance and longer life. You get a safer, easier-to-use rope, because strands are PREformed to lie naturally in place.

The wire that goes into Macwhyte PREformed is processed under constant metallurgical control to make it tougher, more flexible. And when this wire is assembled into strands, PREformed and internally lubricated under close supervision of wire rope craftsmen, it just *has* to be the correct rope for your equipment.

We hope, as many of our friends do, that it will not be too long before we can say, "You can have all you need." In the meantime keep asking . . . not for just "wire rope," but for "Macwhyte PREformed Wire Rope." When it is available you'll have the finest!

MACWHYTE COMPANY

ARMY E NAVY

Wire Rope Manufacturers

NO. 786

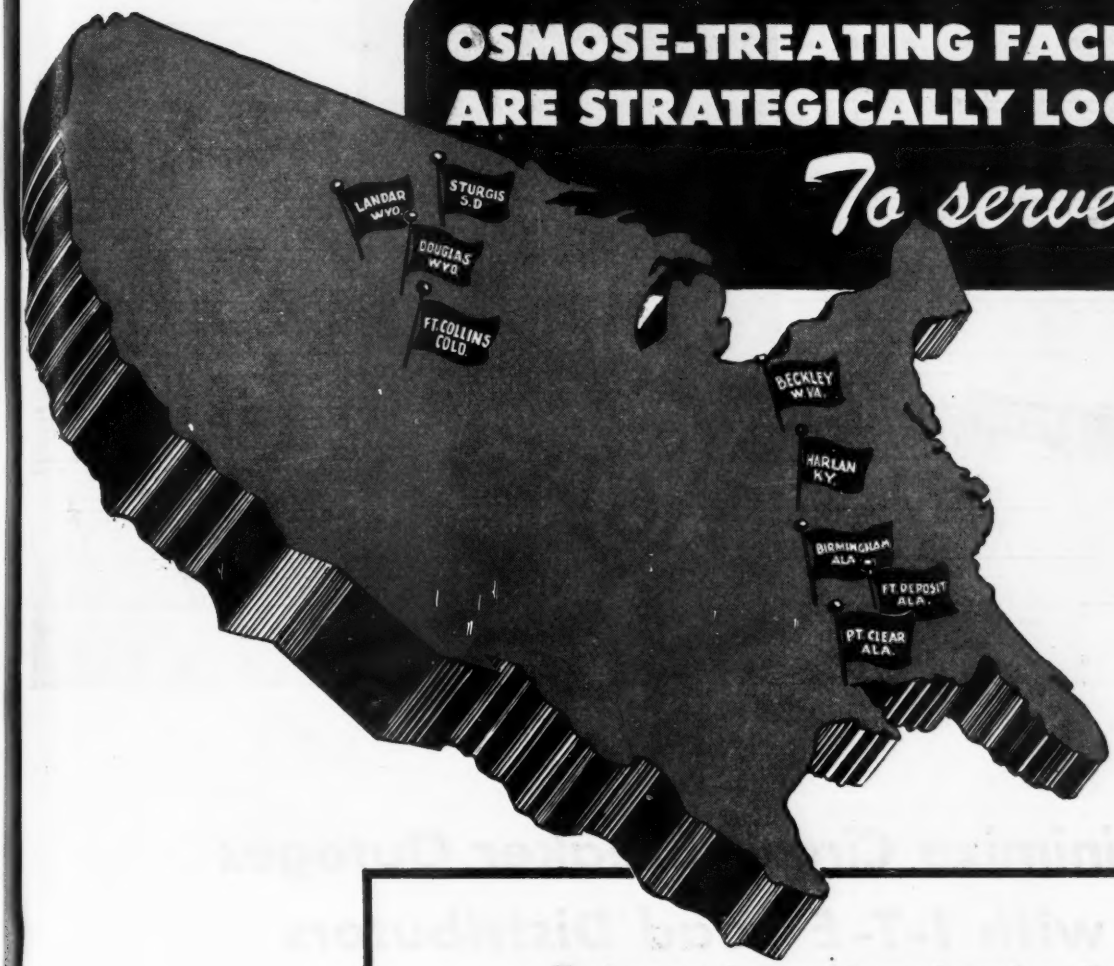
2931 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Rope
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie-Rods
MACWHYTE Stainless Steel Wire Rope
MACWHYTE Monel Metal Wire Rope

OSMOSE-TREATING FACILITIES ARE STRATEGICALLY LOCATED

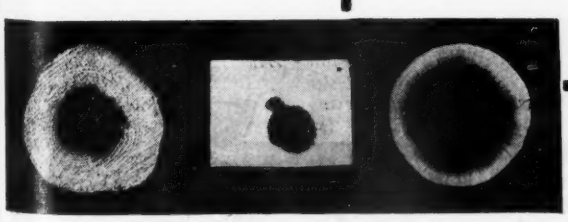
To serve you



A glance at the map above shows how Osmose-Treated Timber is now available in mining areas . . . to give the best possible service to the mining industry.

This new service will be of interest to those who are faced with the problem of making mine ties and timbers last longer in the face of dwindling supplies and manpower. These sources are equipped to either treat your timbers or supply you with good quality Osmose-treated timbers to your specifications.

The Osmose-treating process is not new. It is natures method of pressure treatment for deep penetration of toxic preservatives into the wood. It has been thoroughly time-proven by many industries, for many uses. The fact that Osmosalts . . . basic material of the process . . . is clean, paintable and a fire retardant, makes it particularly suitable for many uses where tar-base preservatives would be definitely impractical. In addition to the above service, we can supply Osmosalts to those who prefer to do their own treating. Write for information.



Illustrated above are cross sections of three kinds of timbers. The white outer areas, which have been subjected to standard color reagent tests, show the deep penetration of the toxic chemicals in Osmosalts.

OSMOSALTS

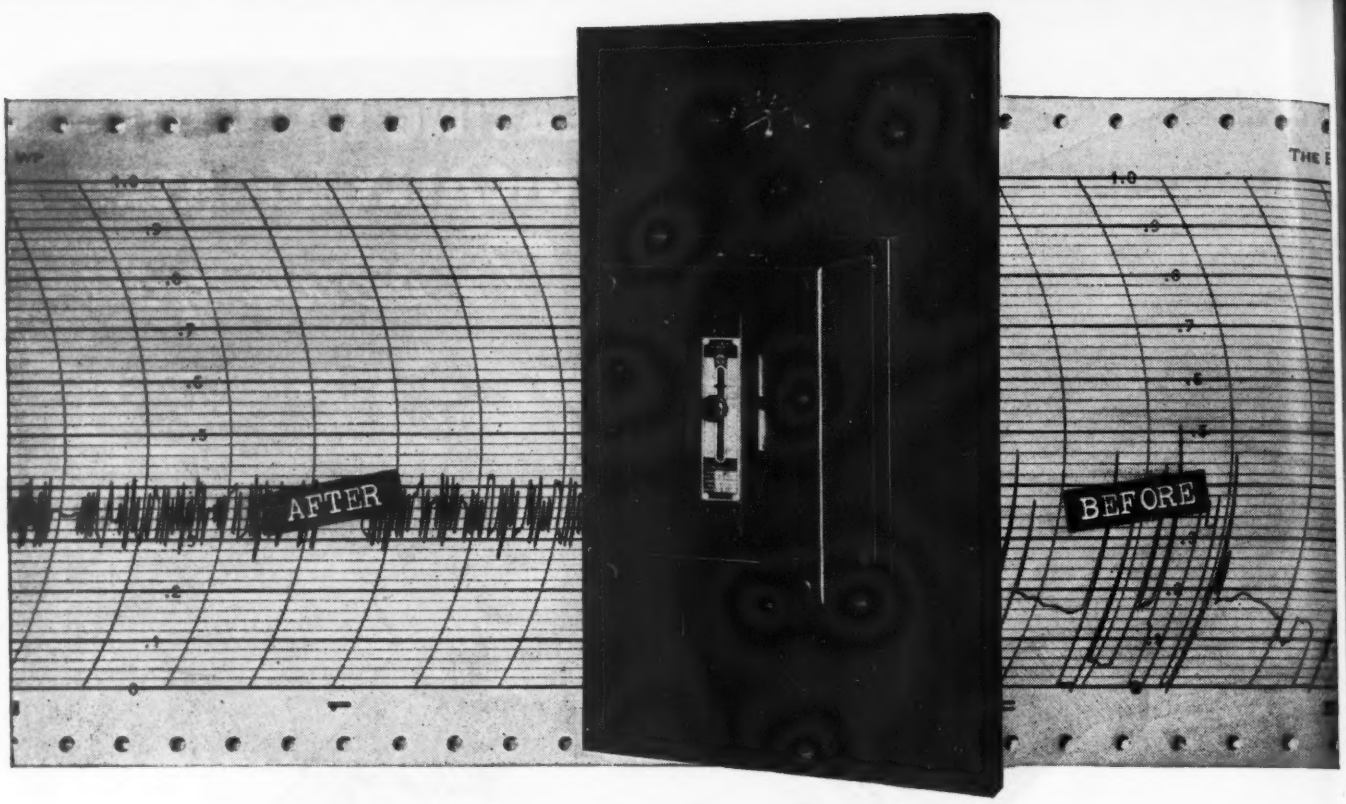
Nature's Method of Wood Preservation

Composition and Process Patented and Patents Pending

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.

GENERAL OFFICES: BUFFALO 12, N. Y.

BRANCH AND SALES OFFICES: BIRMINGHAM 3, ALA.; DENVER 2, COLO.; BECKLEY, W. VA.; HARLAN, KY.



Minimize Circuit Breaker Outages with I-T-E Load Distributors

• I-T-E Load Distributors can help you obtain maximum coal production because they eliminate unnecessary circuit breaker outages. Furthermore, they reduce maintenance of commutators, brushes and other electrical equipment. Time otherwise lost by circuit breaker outages and repairs to equipment is thus made productive.

These benefits are possible because the I-T-E Load Distributor apportions peak loads among the several parallel-connected motor-generator or rotary converter substations. It automatically reduces the voltage at the substation nearest the overload, so that the current is drawn from more distant substations. Duration of the voltage reduction is very short and is seldom noticed outside of the affected substation area.

On single installations of an m-g set or rotary converter, the I-T-E Load Distributors can be used in conjunction with a circuit breaker as a load limiting device. It serves to reduce breaker outages and unnecessary wear and tear on the equipment.

The I-T-E Load Distributor is built on a 16" x 28" panel with a dust-proof case protecting the mechanism. It is a simple device, readily installed and easily adjusted for specific conditions.

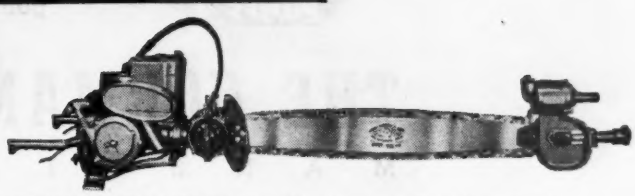
For full details, write for Bulletin 2502.

I-T-E

Representatives in Principal Mining Areas

CIRCUIT BREAKER CO.,
PHILADELPHIA 30, PA.

DISSTON CHAIN SAWS ENABLE ONE CREW TO EQUAL THE WORK OF TWENTY MEN



DISSTON CHAIN SAW *with Mercury Gasoline Engine*
Model G-26—6 H.P. 24" capacity. Model G-36—6 H.P. 36" capacity

DISSTON CHAIN SAW—*Pneumatic*
Model P-27—3½ H.P.; 90 cu. ft. at 90 lbs. pressure, 24" capacity

Wherever there are timbers to cut, work can be speeded up and costs reduced by using Disston Chain Saws—one of the most important developments in saws in years. This is being demonstrated in coal mines throughout the country, where props, beams, ties and other timbers are being cut at a rate of an inch a second. In many mines Disston Chain Saws are helping materially to overcome the handicap of manpower shortage.

There are two types of Disston Chain Saws: with Mercury Gasoline Engine; and with pneumatic drive. Each can be depended on for efficient performance and long life. They are economical too, soon paying for themselves from savings in labor costs alone.

Disston Chain Saws are of extra sturdy construction. They are light in weight, easy to operate, and require no previous experience. They are designed for both horizontal and vertical cutting, and can be used successfully on woods of all degrees of hardness.

Disston Chain Saws are *available now*. Write for full particulars.

HENRY DISSTON & SONS, INC., 642 Tacony, Philadelphia 35, Pa., U. S. A.

HERE'S A REALLY AUTOMATIC TROUBLE-PROOF GATHERING PUMP

Made specially for mine de-watering, this Gorman-Rupp centrifugal pump gives you these four chief operating features.—

1—Fully automatic self-prime, and no chance to lose this prime. The entire cycle - stop - start - prime - run - requires no attention—ever!

2—Ability to handle, not only water, but muck or solids of any size or consistency that will enter the intake strainer.

3—Absolute simplicity—only one moving part in pump—and durable, accurately machined parts will give you 24-hour-per-day service.

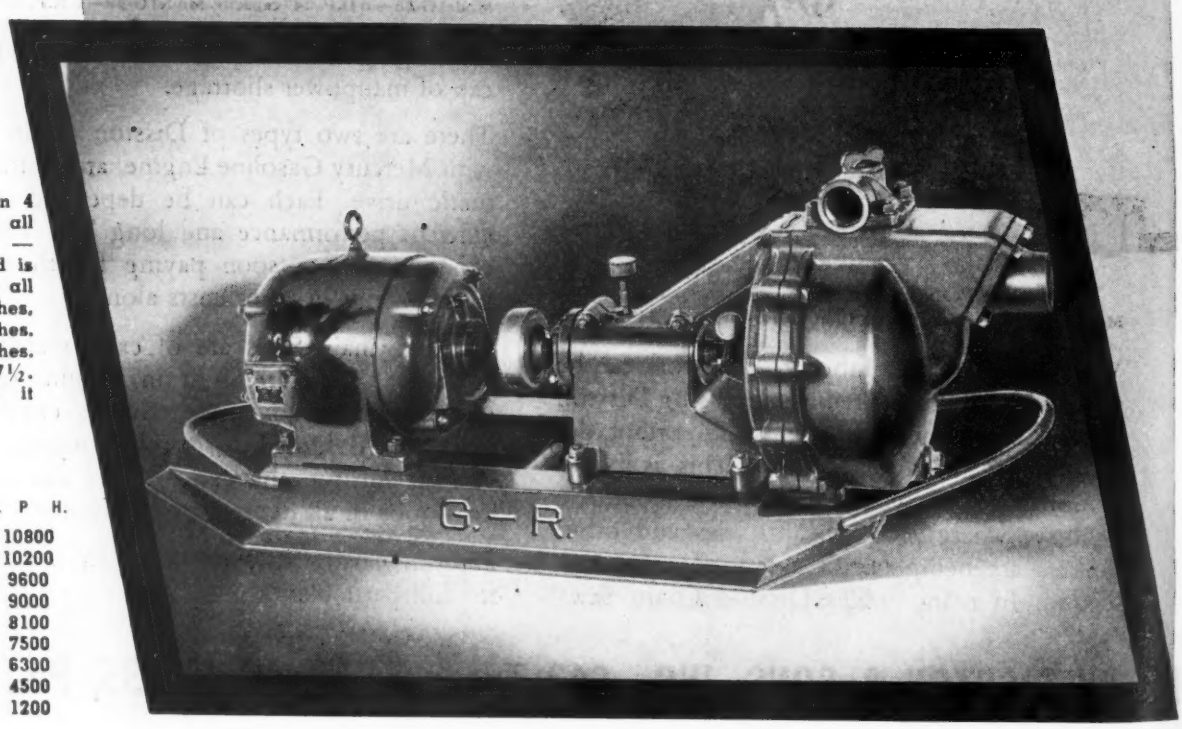
4—All wearing parts are easily and quickly replaced.

GORMAN-RUPP PUMPS — ARMY NAVY — UNSURPASSED FOR PUMPING FAST

Compare their weight, size, cost or operating expense, and you will find Gorman-Rupp pumps to be the most all-around effective mine gathering pump on the market.

THE GORMAN-RUPP COMPANY

MANSFIELD • OHIO



Available in 4 sizes to meet all requirements — Model illustrated is 60-100. Over - all length, 34 inches, width 17½ inches. Height 21¼ inches. H. P., 5 or 7½. Here is what it will do.

TOTAL HEAD FEET	G. P. H.
20	10800
30	10200
40	9600
50	9000
60	8100
70	7500
80	6300
100	4500
120	1200

MINING MADE EASIER!

MINE OPERATORS have reason to appreciate Schramm Air Compressors . . . and today they are installing them in ever-increasing numbers.

Schramm Compressors make your mining job easier—whether it's coal or metal mining. Outstanding features include 100 per cent water cooling . . . mechanical intake valve operating from cam in perfect timing . . . large discharge valves in head . . . forced feed lubrication to every moving part through oil lines drilled in metal.

Too, there's weight reduction up to 40%, without sacrificing an ounce of ruggedness. This means a lightweight, compact Schramm easily moved about on the job. Stationary Schramms are used by the mining industry also, and these come in a variety of sizes.

It will pay you to make your next Compressor Schramm. For full details, we offer you FREE a new Compressor booklet just published. Write for your copy today.

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THE COMPRESSOR PEOPLE
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A DOZEN GOOD REASONS

FOR CHOOSING

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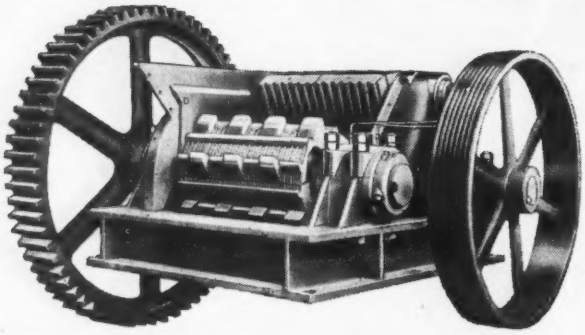
MINE REFUSE AND COAL CRUSHERS



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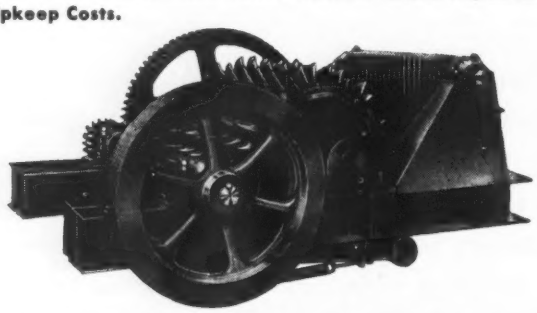

THE STEELSTRUT SLEDGE-WEDGE CRUSHER HIGHEST TON-PER-DOLLAR VALUE

Modernize your present plant with modern dependable, low cost McLanahan equipment. Write for descriptive Bulletins today.

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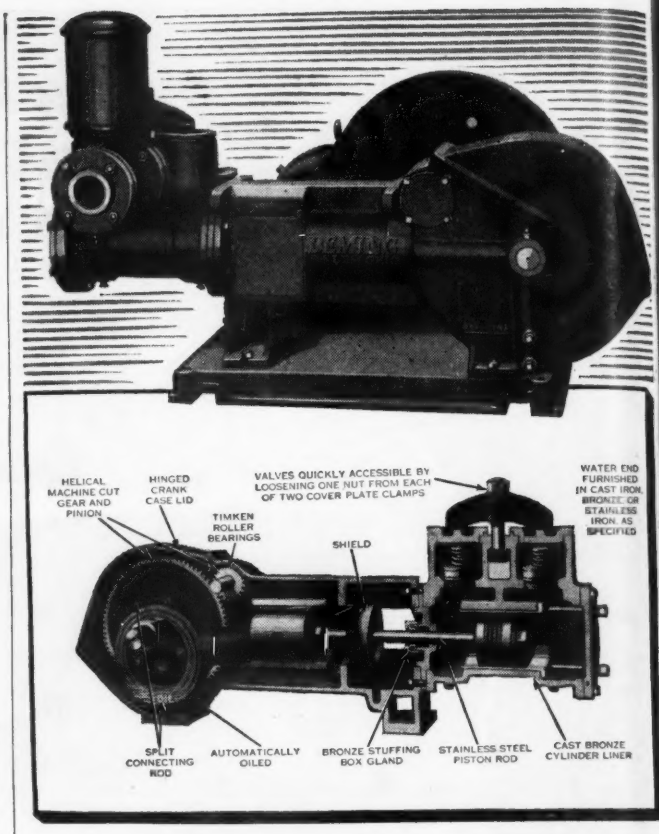
Pit, Mine and Quarry Equipment Headquarters
Since 1835
HOLLIDAYSBURG, PENNSYLVANIA


HELICAL MACHINE CUT GEAR AND PINION
HINGED CRANK CASE LID
VALVES QUICKLY ACCESSIBLE BY LOOSENING ONE NUT FROM EACH OF TWO COVER PLATE CLAMPS
WATER END FURNISHED IN CAST IRON, BRONZE OR STAINLESS IRON AS SPECIFIED
TIMKEN ROLLER BEARINGS
SHIELD
SPLIT CONNECTING ROD
AUTOMATICALLY OILED
BRONZE STUFFING BOX GLAND
STAINLESS STEEL PISTON ROD
CAST BRONZE CYLINDER LINER

DEMING "OIL-RITE"

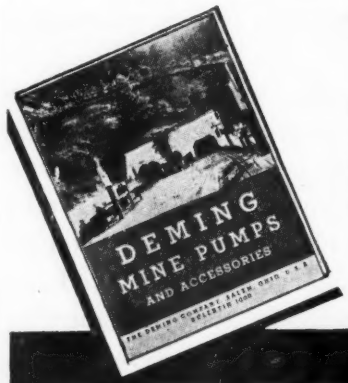
Double-Acting Mine Pumps

Features of the Figure 1896 Deming "OIL-RITE" were designed specifically for heavy duty mine gathering service.

All valves in the water end are accessible without disturbing pipe connections. Timken Tapered Roller Bearings adjustable for wear, are used on the pinion shaft.

Piston rod provides high resistance to scoring and to corrosion by acid water. *Many more features.*

Figure 1896 Deming Double-Acting Mine Pump is furnished in four types of drive, all illustrated and described in Bulletin 1000.

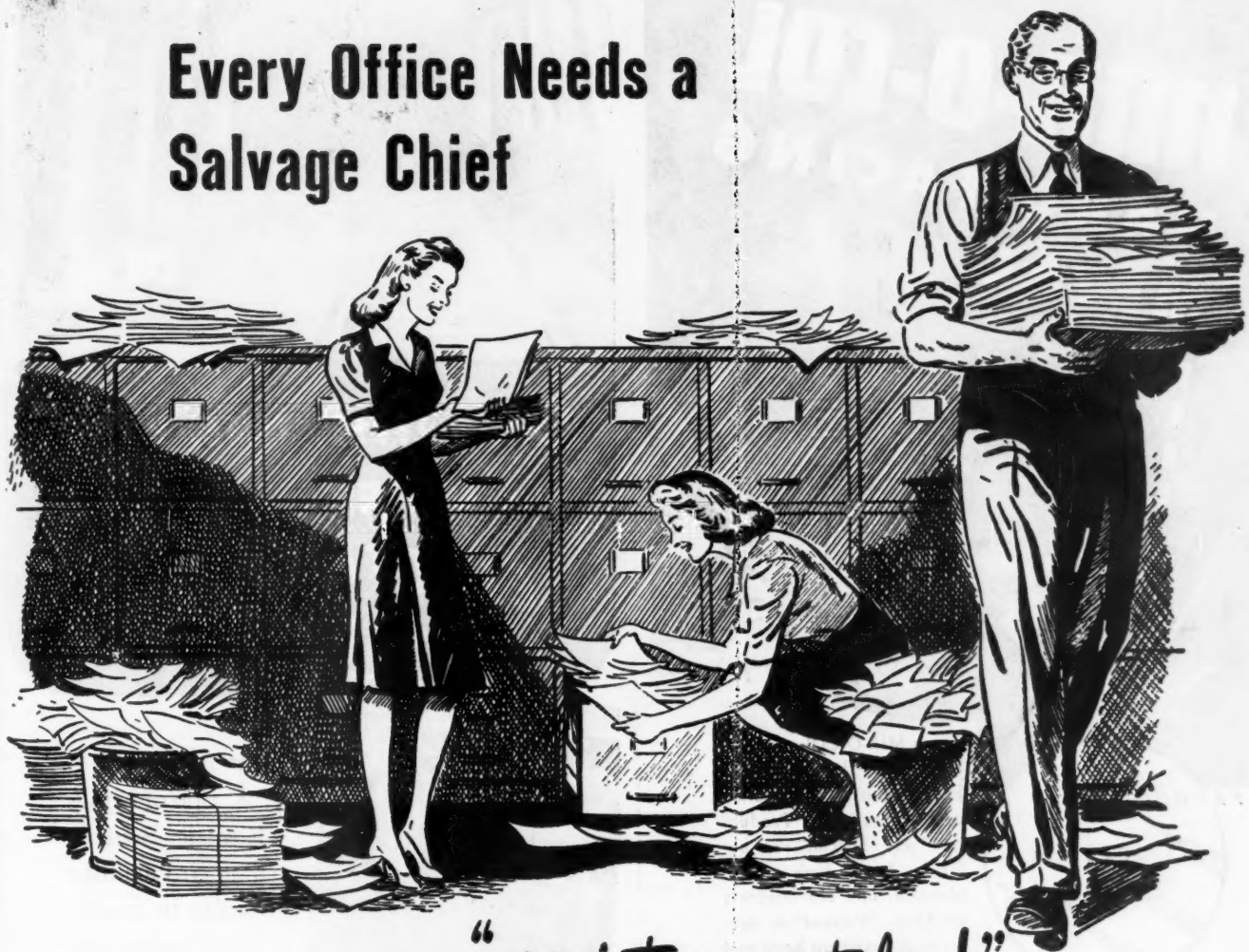


THE DEMING COMPANY
SALEM, OHIO

Send for special Bulletin 1000 which contains important data on the complete line of Deming Mine Pumps and Accessories.

DEMING
Mine Pumps

Every Office Needs a Salvage Chief



"appoint yours today!"

Uselessly stored in many American offices today are tons of *war material!* Vitally needed paper — the raw stuff of blood plasma boxes, shell cases, supply parachutes — *V paper!* It takes many forms . . . dead files, old correspondence, records.

It's easy to put off getting that paper together, bundling it and turning it in. But you should do it for the war effort and for your own sake. Only in this way can we help avoid further civilian paper allotment cuts.

That's why every office should appoint *one person* to act as Salvage Chief. He — or she — can organize the effort, and arrange for regular Paper Salvage days. And the Salvage Chief can remind everyone to adopt conservation measures — to use less paper — as little as possible.

Many organizations which sell their waste paper turn part of the funds over to buy little extras for wounded veterans, or to support some other worthy community project. Thus you have a chance to make your paper serve *twice.*

Get your office paper salvage program rolling *now!*

DOUBLE V PROGRAM

SAVE WASTE PAPER

V TO SPEED VICTORY
V TO AID VETERANS
OR LOCAL PROJECTS

Separate and tie in bundles: 1. Wastebasket scraps. 2. Corrugated boxes, brown paper and bags. 3. Magazines and books. 4. Newspapers.

This advertisement prepared by the War Advertising Council in cooperation with the War Production Board and the Office of War Information. Space contributed to Double V Waste Paper Program by this publication.

MIR-O-COL HARD FACING METAL

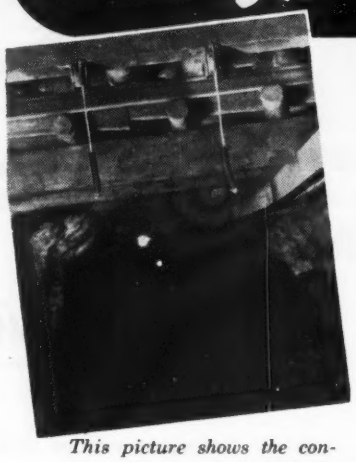
Three MIR-O-COL rods can do 90% of the hard-facing jobs in industry, construction and agriculture. "Production" and "Special" rods are ferrous, having high impact, abrasion, and red hardness qualities. "Valvrod" is non-ferrous, resisting heat and corrosion.

Another way to hold production at the high peak of today's demand is to earn every ounce of work from operating equipment. MIR-O-COL "Production" alloy — the high impact resistant hard-facing metal — returns 3 to 10 times more wear on bucket teeth and lips. These materials are easy to apply by either AC or DC welding methods.

Manufactured by

MIR-O-COL
HARD-FACING RODS
ALLOY COMPANY
2416-60 EAST 53RD STREET, LOS ANGELES, CALIFORNIA

Save LIVES, TIME, POWER with MINES ELECTRIC SWITCHMAN



This picture shows the contactors by means of which the motorman controls the electric switchman.

The installation of Mines Electric Switchman invariably results in immediate reduction of haulage accidents in mines and quarries in which they are installed.

The Electric Switchman is an electric device for throwing mine-track switches and is controlled by the motorman without his leaving the motor, without slackening speed. These features reduce the chances for accidents, speed up haulage, cut down wear and tear on the motor, and conserve power.

Our Bulletin ES-103 describes the Switchman in detail. Send for it — the Mines Electric Switchman will save lives in your mine, too.

MINES EQUIPMENT COMPANY
4263 CLAYTON AVENUE
ST. LOUIS 10, MISSOURI

The greatest help a coal mining man can have—

IF YOU want to make sure of getting your certificate of competency—sure of winning a bigger job with bigger pay, get Beard's great books today and put them to work for you.

In these three books you have a practical, always-on-the-job guide that will help you solve the problems you face every day, show you what to do, tell you why it should be done.

Beard's

Mine Examination Questions and Answers

3 volumes — $7.50, payable in four monthly payments

THESE books explain what a man must know in order to become a mine inspector, a mine foreman, assistant foreman, fireboss, hoisting engineer, safety engineer, shot-firer, etc.

They give you complete and authoritative information about air and gases, explosives, safety requirements and methods, mechanics, engines, hoisting, drainage, pumping, ventilation, timbering, instruments, and every other detail that the practical mining man must know.

Can you answer these questions—

What is meant by splitting the air current and what are the advantages derived from such methods?

Can a miner live in air in which the oxygen content is reduced to 17 per cent?

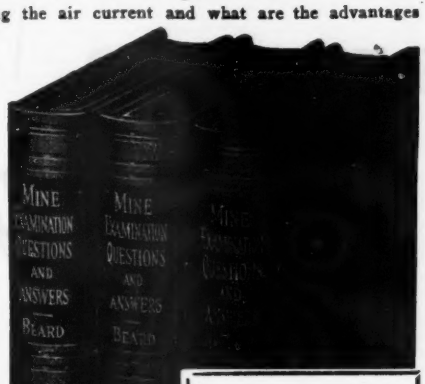
Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

What are the advantages and disadvantages of a gasoline pump, an oil pump and an electrical pump?

What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

These are but a few of the more than 2000 questions given in Beard's books together with full correct answers. Hundreds of men have used this method to prepare for higher, better jobs. You can too, if you have the Beard books and plan to use them systematically. They are the best investment that a mining man can make—not only as an aid for passing examinations but as practical reference volumes on everyday mining operation problems.



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No expense — No obligation

Small monthly payments if you keep them!

McGRAW-HILL ON-APPROVAL COUPON

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Send me, charges prepaid, Beard's Mine Examination Questions and Answers, 3 volumes, for 10 days examination. If satisfactory I will pay $7.50 at the rate of $1.50 in ten days and $2.00 per month. If not wanted I will return the three volumes postpaid.

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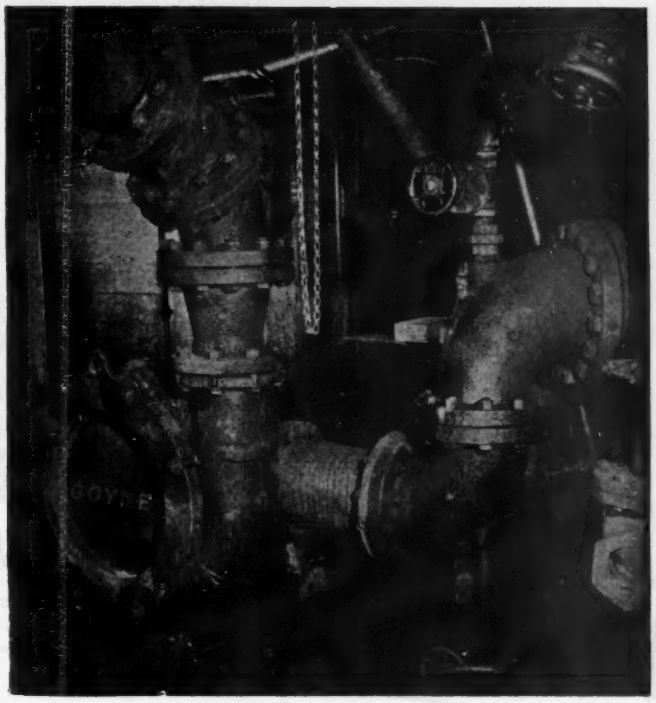
GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.

2. The one packing box of the pump is subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.

3. Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

All inquiries receive prompt and careful attention.

THE GOYNE STEAM PUMP CO.

ASHLAND, PA.

PAYROLL SAVINGS PLAN

NOW'S THE TIME FOR *Your* BIG "MOP-UP"!

RE-SOLICITATION is the keynote for a victorious "mop up" in the Mighty 7th War Loan. Bond rallies plus continuous competition between departments help to keep Bond subscriptions on a quota-topping climb. Strategic poster displays . . . showings of "Mr. & Mrs. America," the Treasury film . . . distribution of the War Finance Booklet, "How To Get There," and the handy Bond-holding envelopes play an important part. But, above all else, arrange to have every employee asked *once more*—and personally urged *once more*—to meet his personal quota in the Mighty 7th!

The Payroll Savings Plan is the mainstay of every War Loan—meeting your plant quota is vital to the success of the 7th! Remember we have to make two drives in 1945 do the work of three last year. Put on an intensive "mop up" final to help mop up the Japs, cut the tentacles of inflation—and lay the foundation of security.

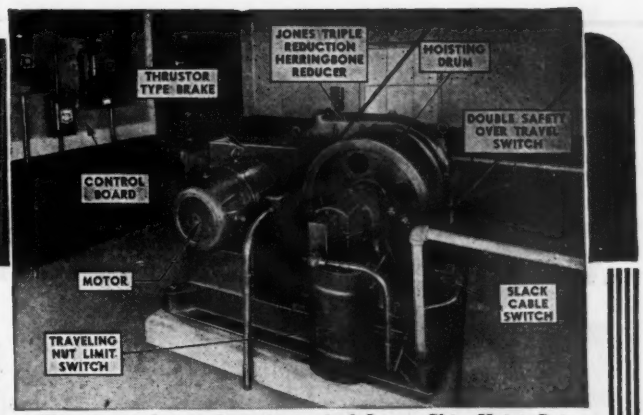
The Treasury Department acknowledges with appreciation the publication of this message by

THE MIGHTY 7th WAR LOAN

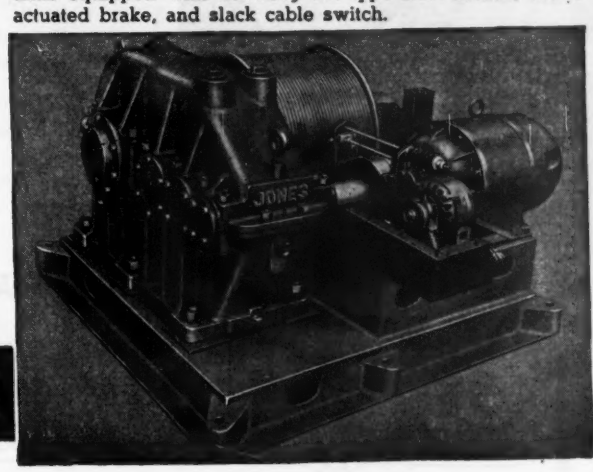
COAL AGE

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

For Economical Material Handling
JONES SKIP HOIST DRIVES



• The view above shows a typical Jones Skip Hoist Drive installation while the view below shows one of the Jones units equipped with traveling nut type limit switch, motor actuated brake, and slack cable switch.



FOR speedy operation, reliable service and over-all economy the Jones Skip Hoist Drive has made a name for itself in a wide variety of material handling service. These skip hoist drives are built as complete units by the Jones organization in several types with base to take any motor specified by the purchaser. They are equipped for all the modern protective devices such as cam or nut type limit switches, solenoid or disc type brakes and slack cable switches. The drives are single, double, or triple reduction Jones Herringbone Speed Reducers, built to stand up under the many years of pounding that a skip hoist drive has to take. The shafts are supported in roller bearings, with rolling action, rack generated gear and pinion teeth to insure easiest possible starting with low starting-peak loads. All reducer bearings and gears are automatic oil-bath lubricated.

The Jones organization has an extensive file of information on skip hoist drive problems and will be pleased to work with you on any problems involving such applications

W. A. JONES FOUNDRY & MACHINE CO.
4401 Roosevelt Road, Chicago, Illinois

Jones HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
FRICTION CLUTCHES • TRANSMISSION APPLIANCES

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SPEER You can depend on SPEER Carbon Brushes to perk up d-c and slip-ring motors and generators because every SPEER Brush is matched—mechanically and electrically — to the service characteristics of the machine it's sold to serve. In the Matched Dependability of SPEER Brushes you get utmost freedom from burning, overheating, sparking, excessive wear and energy losses, and other brush troubles that decrease operating efficiency, cause extra maintenance.

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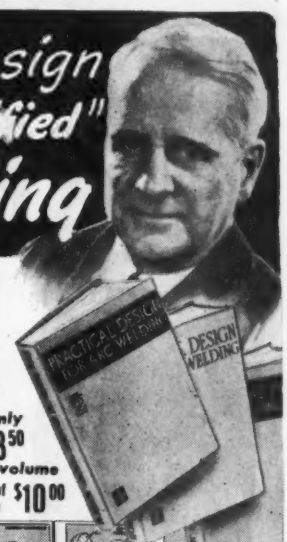

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Continental

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Continental Idlers are made in a complete range of sizes and types for any kind of service. Troughing or Return Rolls of either Cast Iron or Steel are made for belts 14" to 60" wide; Troughing Idlers in 5" and 6" diameter sizes; Return Rolls 4", 5" or 6" diameters. All idlers are equipped with Anti-Friction Bearings.

Consult Continental on your Belt Conveyor problems. We will gladly assist you or make recommendations.

Write for Bulletin ID-105-T.

TRIPPERS PULLEYS TAKE-UPS DRIVES CHUTES
SPOUTS HOLD-BACKS SCRAPERS

INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

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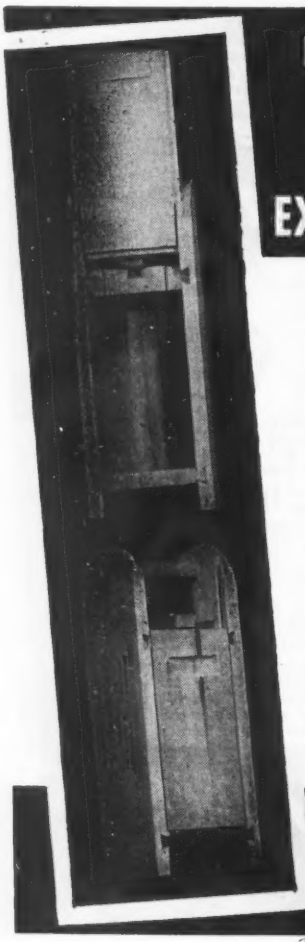

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Latest Type

SAFETY EXPLOSIVE BOXES

Approved by Penna. Dept. of Mines

Boxes are constructed entirely of wood, having no metal parts. They are of tongue-grooved and dovetailed construction, having handle for carrying, and are equipped with automatic lock using rubber bands for a spring.

NOTE: There are NO metal parts . . . conforming to regulations of the Penna. Dept of Mines.

Important: Prompt deliveries of these Hammond products: safety explosive boxes — wood tamping poles — shovel handles — rope rollers — trolley poles.

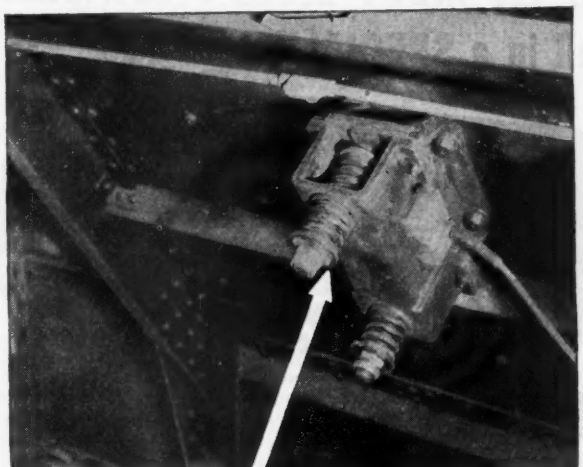
Order today or write for further details.

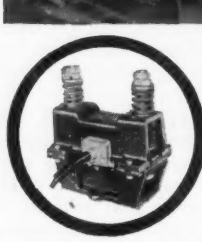
NET PRICES

Boxes Made in These Sizes

No. 9	Powder	Box	9	stick size	1.12
No. 12	"	"	12	" "	1.27
No. 16	"	"	16	" "	1.43
No. 20	"	"	20	" "	1.58
No. 36	"	"	36	" "	2.94
No. 72	"	"	72	" "	4.23
No. 6	Detonator	Box	2½x3x6	inside	1.01
No. 8	"	"	2x2½x8	"	1.01

J. V. HAMMOND
SPANGLER, PENNA.





SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS

Eliminate arched-over and plugged bins, hoppers and chutes—assure a steady, free flow of material.

The vibrator shown above is facilitating the flow of coal through an 8 ft. by 24 ft. chute, made of 1⅜" plate. *Write for illustrated folder.*

SYNTRON CO., 975 Lexington, Homer City, Pa.

Keep your conveyor belts going with

FLEXCO

HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

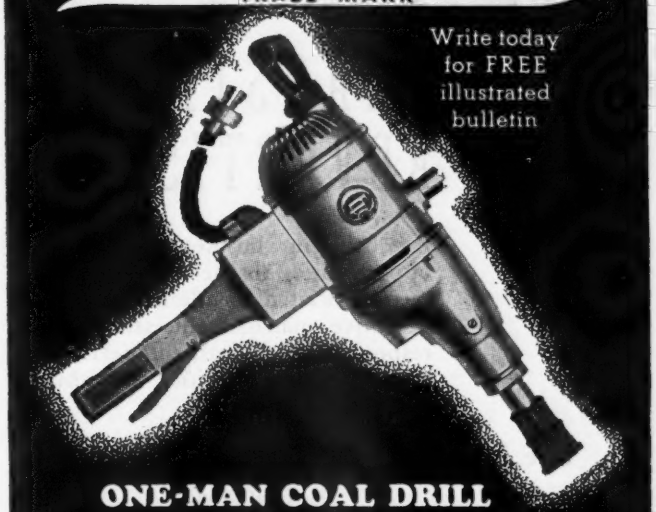
Write for your copy

FLEXIBLE STEEL LACING COMPANY
4638 Lexington St., Chicago

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

The Cincinnati

TRADE MARK



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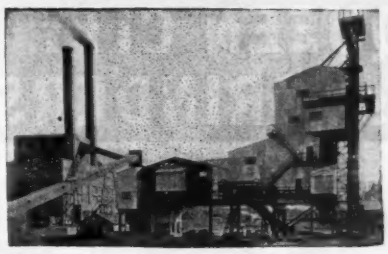
ONE-MAN COAL DRILL

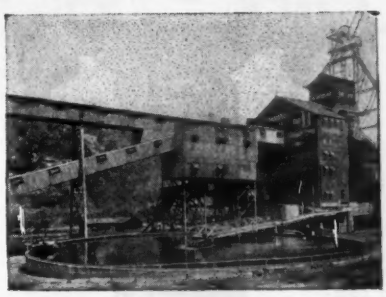
. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day". Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

THE CINCINNATI ELECTRICAL TOOL CO.
Division of The R. K. LeBlond Machine Tool Co.
2635 MADISON ROAD - CINCINNATI 8, OHIO

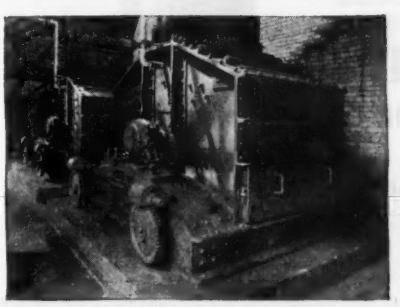
"PENNSYLVANIA"



"Pennsylvania" Bradford Breaker and Cleaner preparing ROM coal for pulverizing at Mine Mouth Station.



"Pennsylvania" Bradford Breaker and Cleaner preparing 500 TPH of ROM for Washing.



"Pennsylvania" REVERSIBLE Hammermills preparing Bradford-treated coking coals for By-Product Ovens.

"Pennsylvania" Slow Speed Granulator preparing "Premium" Domestic Stoker Sizes at Mine.

"Pennsylvania" Type K Single Roll Crusher installed at Mine for preparing Commercial Sizes.

World-wide installation of these "Pennsylvania" STEELBUILT types, prepare approx. 300,000,000 tons of steam and coking coals per annum.

OUR EXPERIENCE IS AT YOUR SERVICE.

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PENNSYLVANIA CRUSHER COMPANY

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KEEP TOOLS SHARP with QUEEN CITY Low-Cost GRINDERS

It takes a top-quality grinder to stand up under the heavy work that pours through a mine maintenance shop. Queen City Grinders are noted for their durability, freedom from downtime, and dependable performance.

Illustrated is the 5 H.P. Heavy Duty Queen City Floor Grinder (No. 11-F), equally adaptable to fine or heavy work. Has numerous safety and operating features. Send for catalog complete with prices and details.

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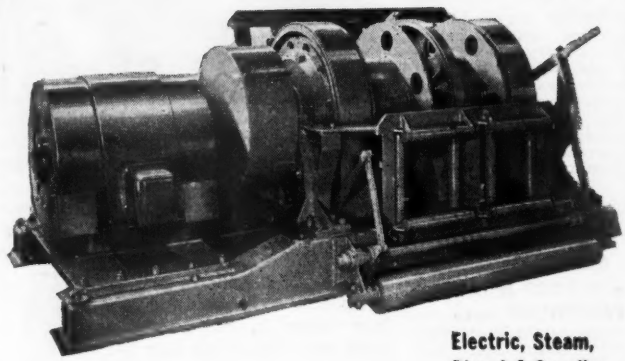
VULCAN

HEAVY DUTY DENVER *Scraper Loaders*



With 100 H.P. Continuously Rated Motors. Seventy in use at one property. Engineered for 60" to 72" scrapers. Steel construction; ball bearing thruout

Electric, Steam, Diesel & Gasoline Hoists; Scrapers, Loaders, Conveyors, Skips, Cages, Sheaves.

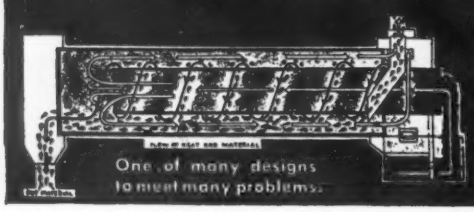
VULCAN IRON WORKS CO
DENVER COLORADO

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

Benefit by the many years of experience in designing and manufacturing of

The L. R. CHRISTIE CO.

17 E. 42nd Street
New York 17, N.Y.



One of many designs to meet many problems.

Dryers
Calciners
Coolers

National CLASSIFIED ADVERTISING

for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities with the industries served by

The SEARCHLIGHT SECTIONS of

Air Transport
American Machinist
Aviation
Aviation News
Bus Transportation
Business Week
Chemical and Metallurgical Engineering
Coal Age
Construction Methods
Electrical Contracting
Electrical Merchandising
Electrical World
Electronics
Engineering News-Record
Engineering and Mining Journal
E & M J Markets
Factory Management and Maintenance
Food Industries
Power
Product Engineering
Textile Wold.

For advertising rates or other information address:
Departmental Staff

McGRAW-HILL PUBLISHING CO., INC.
330 W. 42nd St., New York 18, N. Y.

NEW LIFE FOR OLD CABLES

7 Point Superiority

1 Double grip . . . both sides adhesive.
2 Great tensile strength . . . tough.
3 Won't tear, ravel or pucker.
4 Resists abrasion.
5 Acid- and alkali-proof.
6 Extra thick . . . one layer insulates.
7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

RUBEROID

INSULATING TAPE

The RUBEROID Co., Executive Offices, 500 Fifth Avenue, New York 18, N. Y.

IMPROVED SUTTON SAND DRYING STOVE

The same time tested principle for drying sand as used in Sutton STANDARD Sand Drying Stoves for more than forty years is employed in the No. 0 Sutton IMPROVED Sand Dryer.

NEW FEATURES

- PERFORATED RING of an entirely new design.
- A FIRE BOWL added between the grate and perforated ring.
- New type FIRE GRATE.
- ASH PIT DOOR EXTENSION to protect clean sand from ashes.
- 3/16" STEEL PERFORATED SKIRTING with Clean out Doors.
- ECONOMY FLAME SPREADER in dome.

Catalog and Prices sent upon request.

INDIANA FOUNDRY COMPANY

950 Oak Street, Indiana, Pa.

HOFFMAN BROS. DRILLING CO.

Diamond Core Drilling Contractors
Punxsutawney, Pa. · Tel. 382

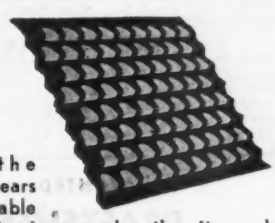
WE HAVE SPECIALIZED IN TESTING BITUMINOUS COAL LANDS FOR MORE THAN 40 YEARS

GASOLINE • STEAM • ELECTRIC DRILLS • WE PRE-GROUT SHAFT LOCATIONS • HORIZONTAL DRILL HOLES FROM 3" TO 16" FOR DEWATERING MINES • OUR OPERATORS ARE HIGHLY SKILLED

WE HAVE ALWAYS GUARANTEED SATISFACTORY COAL CORES . . . We solicit your inquiries

HENDRICK FLANGED LIP SCREENS

For more exact sizing!



Since Hendrick developed the Flanged Lip Screen over 10 years ago, it has proved the best available for screening and dewatering bituminous and anthracite coal. Tapered openings guard against clogging—speed screening! Flange at the end of each clot agitates material, shakes off slack, and provides more efficient separation. Write for full data.

HENDRICK MANUFACTURING CO.

64 DUNDAFF ST. CARBONDALE, PA.

Sales Offices in Principal Cities

WOOD PIPE for Mine Drainage

Wyckoff Wood Pipe has a 90 year record of perfect resistance to the corrosive action of sulphurous mine water. It is an ideal, long-time investment—light, easy to lay, and relatively low in first cost.

We also manufacture a special Hard Maple Pipe for flushing culm in the Anthracite Region and wood covering for underground steam lines.

Established 1855

Emergency orders can be delivered by truck to mines in Pennsylvania coal fields following morning after receipt of same.

Shipments from stock day after receipt of order. Send for catalog.

A. WYCKOFF & SON CO.

Office and Factory
No. 35 Home Street, Elmira, N. Y.
The Originators of Machine Made Wood Pipe

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RELEASE

UNDISPLAYED RATE:

Not available for equipment advertising

10 cents a word, minimum charge $2.00. (See ¶ on Box Numbers.)

POSITIONS WANTED (full or part-time individual salaried employment only), ½ the above rates.

PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $6.30 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page. C.A.

NEW ADVERTISEMENTS received by 10 A. M. June 29th will appear in the July issue subject to limitations of space available.

POSITIONS VACANT

WANTED: EXPERIENCED, capable, reliable coal mining engineer. City office, Southern West Virginia. Communications confidential. P-308, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

MID-WEST MANUFACTURER of conveying and elevating equipment has opening for designing or estimating engineer with experience in conveyor layout and design or operation. Write P-309, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

BUSINESS OPPORTUNITIES

FOR SALE—Coal, 2000 acres, largely undeveloped, Smith River district of Great Falls Coal Field. Medium-grade bituminous, 10,750 BTU, six foot vein, good conditions. Drift mine unequipped; truck 18 miles to rail towns; 30 to Great Falls. Price very reasonable. L. J. Howard, 913 Third Avenue North, Great Falls, Montana.

INACTIVE MINE owner will make attractive deal with operator having mechanical loaders, etc., for use in high coal. Describe equipment. BO-310, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

FOR SALE: 1200 acres of coal land carrying the Splash Dam, Clintwood and other seams, two miles frontage on Norfolk and Western Railway. This is offered for sale by me to settle an estate. W. L. Dennis, Grundy, Virginia.

ANTHRACITE CLAIMS for sale in Province of Quebec. Coal showing on surface. Same as Pennsylvania coal land. Apply to BO-311, Coal Age, 330 W. 42nd St., New York 18, N. Y.

FREE BULLETIN

LIST NO. 28—4x9, 28 pages, indexed. Listing new and honestly rebuilt mining equipment, in over 60 groups ranging from blowers to welders, available from stock. Write Guyan Machinery Co., Logan, W. Va.

WANTED

DRAFTSMEN

Designers, layout men and detailers experienced in elevating and conveying machinery or reinforced concrete, steel and wood structures as applied to coal handling and preparation plants. State qualifications, experience and compensation expected.

ROBERTS AND SCHAEFER CO.

307 North Michigan Avenue

Chicago 1, Ill.

WANTED

Mechanical Engineer

With design and layout experience on material handling and coal preparation equipment by mid-western manufacturer outside metropolitan district. Give experience and salary expected.

P-306, Coal Age

520 N. Michigan Ave., Chicago 11, Ill.

CUTTING MACHINES

8—29-C Jeffrey Bottom Cutters, 250 volt DC.
3—Sullivan CLU, 250 volt DC.
10—12-AA Goodman, 250 volt DC.

LOCOMOTIVES

8—8-ton G. E., type HM-822, Mica Glass Insulated Coil Armatures, 250 volt B. B. motors, CY-21 reels. All completely rebuilt.
8—8-ton Goodman, 32-0-4-T, 250 volt B. B. motors.
3—8-ton G. E., type HM-819, 250 volt B. B. motors.
2—8-ton Goodman, flame-proof, 250 volt B. B. motors, late type, 44″ gauge.
4—13-ton Jeffrey, MH-77, 250 volt B. B. motors, 44″ gauge.
2—13-ton Goodman type 36-A, 250 volt B. B. motors, 44″ gauge.

Frank J. Wolfe

MOTOR GENERATOR SETS

2—200 KW Motor Generator Sets, 250/275 volt DC, 1200 RPM, 3 phase, 60 cycle, 2300 volt AC, complete with switchboards and switchgear.

MISCELLANEOUS

We have several 4 and 5-track complete steel tipples, electric hoists from 300 to 1300 H.P. for slope, shaft and drift mines.

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES CO.

306-7 Beasley Building *L. D. PHONE—34* Terre Haute, Indiana

WANTED

Manager for our Machinery and Equipment Department

Experienced with machinery and equipment used in heavy industries — like cranes, ground and overhead; steel buildings and structures, power plants, mining contractors, etc. Drawing account and participation. Unusual opportunity for good high grade man. Confidences respected.

IRON & STEEL PRODUCTS, INC.

40 years' experience
13484 S. Brainard Avenue,
Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

UNIVERSAL TOOLS! NATIONALLY ADVERTISED BRANDS AND PRICES.

If it's Tools—We have it, Can get it, or it isn't made! *Price List & Order Blank Free!!*

UNIVERSAL TOOL COMPANY

O. B. Demattels, President
1527 Grand P. Kansas City, Missouri
Immediate Shipment: Overnight by Air: To Anywhere—USA.

FOR SALE AND IMMEDIATE DELIVERY

12 Goodman, 44-C, 8½′ Cutter Chains, 9 position. Good as new. Price $4.70 per block, new price $6.85 per block.

SHULER COAL COMPANY

507 Equitable Bldg., Des Moines, Ia.

WANTED

Distributors or Manufacturers'

REPRESENTATIVES

calling on coal preparation plants, to handle slotted opening bar screen used in sizing and dewatering fine coal.

See advertisement page 162 this issue. Will give exclusive territory.

WEDGE-BAR SCREEN CO.

145 Hudson Street New York, N. Y.

WANTED

STEAM DINKY LOCOMOTIVE

42 guage, 9 x 14 Equipped to burn coal

W-307, Coal Age

330 West 42nd St., New York 18, N. Y.

CAPITAL AVAILABLE

for acquiring all or controlling interest in going anthracite or bituminous mine that warrants strictest investigation.

Write P. O. Box 490, Pittston, Pa.

Strippers Use ECONOMY

Stripping Contractors are using ECONOMY COMPANY to get digging and hauling equipment on their jobs, *fast*, and from points close to the work.

ECONOMY COMPANY'S extensive listings, covering the entire country from Coast to Coast, show many shovels, draglines, trucks and other essential Stripping, Loading and Hauling Equipment, located in and near all stripping areas. Or, an economical buy may frequently be made in a more distant section, when dealing through ECONOMY COMPANY.

Phone us to-day for full details on any of the equipment listed below, and we'll be glad to arrange an inspection before shipment.

SHOVELS—CRANES—DRAGLINES

DIESEL 2 YARD OSGOOD

One—Osgood Diesel 2 yd. Model 902. Power supplied by D-17000 Caterpillar Diesel Engine. 75' dragline boom and 2 yd. dragline bucket. This unit can be inspected and shipped immediately in rebuilt and guaranteed condition. Pennsylvania.

LIMA DIESEL 2 YARD DRAGLINE

One—2 yd. Lima 802. Power supplied by Waukesha Hesselman Diesel Engine. 70' dragline boom. 2 yd. dragline bucket. Rebuilt and guaranteed. Pennsylvania.

1¾ YARD LIMA DRAGLINE

One—1¾ yd. Lima 701. 75' Boom. Buda gas engine. 1¾ yd. dragline bucket. Rebuilt and guaranteed. Ready for immediate shipment. Pennsylvania.

1½ YARD DIESEL DRAGLINE

One—1½ yd. Caterpillar Diesel powered Browning and Dragline combination.

2 YARD NORTHWEST MODEL 8 DRAGLINE

One—2 yd. Northwest Dragline Model 8. 75' Boom. 2 yd. dragline bucket.

1¾ YD. MARION SHOVEL-DRAGLINE

One—1¾ yd. Model 371 Marion. Serial number up in 6700s. 80' dragline boom. 23' jib. 16' gantry. Buda gas engine. Complete shovel attachment. In rebuilt condition. New York City.

1¾ YARD DIESEL P&H DRAGLINE

One—P&H 1¾ yd. dragline. 60' Boom. Two Buckets. Machine is in exceptionally good condition. Ready for immediate shipment.

2 YARD PAGE DRAGLINE

One—2 yd. Page Model 411 Dragline. 60' Boom. Two drag buckets. Diesel powered. Midwest.

2 YARD BUCYRUS-ERIE DIESEL 50B

One—2 yd. Bucyrus-Erie 50B Diesel Crane and Dragline. Very reasonably priced. New Jersey.

2½ YARD MONIGHAN WALKER DRAGLINE

One—2½ yd. Monighan Walker Dragline. 82' Boom. Indiana.

3 YARD DIESEL MONIGHAN DRAGLINES

Two—3 yd. Diesel Monighan Draglines. Diesel powered. Condition good. Immediate shipment Indiana.

5¼ YARD MODEL 4W MONIGHAN

One—5¼ yd. Bucyrus-Monighan 4W. 115' Boom. Oversized Diesel Engine. Excellent condition. Pennsylvania.

5 YARD ELECTRIC SHOVELS-DRAGS

Two—5 yd. Bucyrus-Erie 120B Electric Shovel and Dragline combinations with two buckets of 4½ yds. and 5 yds. Shovel boom 32'. Dragline boom 80'. Midwest.

3 YARD MARION ELECTRIC SHOVELS

Two—3 yd. Marion Electric Shovels. 35' Boom. 25' dipper stick. Ready for immediate shipment. Midwest.

A complete selection of Electric Shovels and Draglines from ¾ yds. up will be sent on request.

STEAM SHOVELS AND DRAGLINES

¾ yds. up to 8 yds. — Information will gladly be supplied and arrangements for inspection will be made on request.

One—⅜ yd. Bay City Model 20 Shovel and Backhoe combination.
One—⅜ yd. Ohio Shovel. New England.
One—⅜ yd. Bay City "Pup"—¾ swing Shovel. New England.
One—⅜ yd. Buckeye Crane. Ohio.
One—½-⅝ Yd. Model 33A Lorain. Virginia.
One—⅜ yd. Byers Model 40 Shovel. Kansas.
One—⅜ yd. Byers Bearcat Shovel. Oklahoma.
One—⅜ yd. Universal Shovel. Illinois.
One—⅜ yd. Byers Bearcat Jr. Shovel. Kansas.
One—⅜ yd. Hanson Chain Crowd Shovel. Ohio.
One—⅜ yd. Universal Shovel—¾ swing. Michigan.
One—⅜ yd. ¾ swing Fundum. Michigan.
One—⅜ yd. Very late model Hanson 33 Shovel. Ohio.
One—⅓ yd. Insley Shovel and Backhoe combination. ¾ Swing. Illinois.
One—¼ yd. Insley Shovel—Type C. Pennsylvania.
One—⅜ yd. Lorain Model 27 Shovel. New England.
One—⅜ yd. Universal shovel. Pennsylvania.
One—⅜ yd. Universal Shovel. Ohio.
One—⅜ yd. Wilford Shovel and Crane. West Coast.
One—½ yd. Bay City Model K-2 Shovel. Pennsylvania.
One—½ yd. Bucyrus-Erie 10/20 Crane. Delaware.
One—⅝ yd. Byers Shovel. Missouri.
One—½ yd. Byers Backhoe Crane and Dragline combination. Missouri.
One—⅝ yd. Byers Bearcat—½ swing. Florida.
One—⅝ yd. Byers Bulldog Type Crane. Up-State New York.
One—½ yd. General Backhoe-Crane combination. New Jersey.
One—½ yd. General Crane only New Jersey.
One—½ yd. Crane. Ohio.
Two—½ yd. Byers Bearcat Cranes. Pennsylvania.
One—⅝ yd. General Diesel Shovel and Dragline. Colorado.
One—½ yd. Rebuilt General Shovel and Crane combination. Up-State New Rork.
One—½ yd. Hanson Shovel. Ohio.
One—⅝ yd. Insley Shovel. Maine.
One—½ yd. Insley ½ swing Crane. South Carolina.
One—½ yd. Insley Model R—full swing shovel and backhoe combination. Pennsylvania.
One—⅝ yd. Linkbelt Speeder Shovel and Dragline combination. Idaho.
One—½ yd. Buckeye Crane. Ohio.
One—⅝ yd. Meade & Morrison Shovel and Backhoe combination. Maine.
One—½ yd. Linkbelt Speeder Dragline and Crane. Up-State New York.
One—⅜ yd. Northwest Model 2 Shovel. Alabama.
One—½ yd. Northwest Model 2 Shovel. Kentucky.
One—½ yd. Orton Crane. Up-State New York.
One—⅝ yd. P&H Model 300A Shovel and Dragline combination. Kentuckv.
One—Unit Shovel ½ yd. Pennsylvania.
One—½ yd. Unit Shovel and Crane Combination Model 512. Virginia.
One—¾ yd. 1940 Diesel Lorain 40 Shovel and Dragline. Up-State New York.
One—¾ yd. 1939 P&H Model 255 Shovel Dragline-Crane combination. Midwest.
One—¾ yd. Linkbelt Speeder Model B5 Shovel, Dragline and Backhoe combination. Minnesota.
One—¾ yd. Linkbelt Speeder Model B5 Shovel and Dragline combination. Colorado.
One—¾ yd. General Diesel Backhoe and Crane combination. Up-State New York.
One—¾ yd. 20B Bucyrus Dragline, Diesel powered. Florida.
One—¾ yd. Bucyrus 20B gas shovel. Michigan.
One—¾ yd. Bucyrus-Erie 1030. Ohio.
One—¾ yd. 1940 General Shovel and Backhoe combination.
One—¾ yd. Keystone Excavator Model 4-26. New Jersey.
One—¾ yd. Browning Shovel Dragline Model K-2. Louisiana.
One—¾ yd. Koehring Model 301 Shovel and Crane combination. Ohio.
One—¾ yd. Koehring 301. Illinois.
One—¾ yd. Koehring 301 Shovel. Montana.
One—¾ yd. Lorain 40 Shovel and Dragline. Colorado.
One—¾ yd. Lorain 40 Shovel. Up-State New York.
One—¾ yd. Lorain Shovel. Arkansas.
One—¾ yd. Linkbelt Dragline. South Carolina.
One—¾ yd. Lorain 45. Tennessee.
One—¾ yd. Thew Lorain Shovel. Oklahoma.
One—¾ yd. Marion Model 7 Dragline. West Coast.
One—¾ yd. Northwest Model 3. Up-State New York.
One—¾ yd. Northwest Model 3 Shovel and Dragline combination. West Coast.
One—¾ yd. Northwest Model 102 Shovel. New England.
One—¾ yd. Osgood Shovel. Up-State New York.
One—¾ yd. P&H Model 204. Oklahoma.
One—¾ yd. P&H Model 204. New York City.
One—¾ yd. P&H Model 400. Michigan.
One—¾ yd. P&H Model 400 shovel and dragline combination. Montana.
One—1 yd. Austin Shovel and Crane-Dragline combination. Michigan.
One—Bucyrus-Erie Model D2—1 yd. Diesel Shovel. New York.
Two—1 yd. Bucyrus-Erie Diesel Dragline and Crane combinations. Louisiana.
One—1 yd. Bucyrus-Erie GA2. Michigan.
One—1 yd. Bucyrus-Erie GA3 dragline. Ohio.
One—1 yd. Byers "Master" Crane. New Jersey.
One—1 yd. Byers Model 29 Crane. Massachusetts.
One—1 yd. Linkbelt Model K-90. Utah.
One—1 yd. Linkbelt Model K-1. Illinois.
One—1 yd. Lorain Model 55 Shovel. Texas.
One—1 yd. Lorain 60A Shovel. Arkansas.
One—1 yd. Marion Model 440—Diesel powered. Louisiana.
One—1 yd. Northwest Model 4 dragline. New York City.
One—1 yd. Lorain 60A Crane and Shovel combination. Ohio.
One—Thew Lorain Shovel—1 yd. Pennsylvania.
One—1 yd. Northwest Model 104. Oklahoma.
Two—1 yd. Northwest Model 105 Shovel and Dragline combination. Michigan.
One—1 yd. Osgood Shovel and Backhoe combination. New York City.
One—1 yd. P&H Model 400 Dragline. Southern location.
One—1 yd. P&H Model 455. Pennsylvania.
One—1 yd. P&H Model 600D Shovel. Vermont.
One—7 yd. P&H Model 600 Crane. New Jersey.
One—1 yd. Speed Crane. New York City.
One—1¼ vd. Austin Crane Model 50. W. Virginia.
One—1¼ yd. Bucyrus-Erie Gas-Air Shovel. Pennsylvania.
One—1¼ yd. Bucyrus-Erie Gas-Air 2 Crane. Up-State New York.
One—1¼ yd. Byers Master Shovel. New Jersey.
One—1¼ yd. Koehring Model 1 Shovel. Virginia.
One—1¼ yd. Lima 101 Shovel. Pennsylvania.
One—1¼ yd. Lima Model 101. West Coast.
One—1¼ yd. Lorain 75A Crane and Dragline. Florida.
One—1¼ yd. Marion Model 40 Gas-electric Shovel. Oregon.
One—1¼ yd. Marion Model 450. West Coast.
Ten—1¼ yd. Northwest Model 104. Complete information on request.
One—1¼ yd. Osgood. New Jersey.
One—1¼ yd. Osgood Shovel Dragline Model 60—heavy duty. Utah.
One—1¼ yd. Osgood Shovel. Up-State New York.
One—1¼ yd. P&H 600. Iowa.
One—1¼ yd. P&H Model 650 Shovel. Wyoming.
One—1¼ yd. P&H 650 combination. Oklahoma.
One—1¼ yd. P&H Model 650 Dragline Shovel combination. Pennsylvania.
One—1¼ yd. P&H 700 Gas Shovel. Arkansas.
One—1¼ yd. P&H Model 700. Michigan.

Please phone, write, or wire, for detailed information on any of these machines. Will gladly arrange for inspection.

DUMP TRUCKS

21 Yd.—One Diesel 21 Yard Euclid Bottom Dump Model 5 LDT. Midwest.
18 Yd.—Three Diesel 18 Yd. Euclid Bottom Dump Model 4 LDT. Midwest.
20 Yd.—Three 20 Yd. Maxi Two-Way Side Dumps. W. Va.
18 Ton—Three 18 Ton Euclid Bottom Dumps Model 12WCL. Ohio.
14 Ton—Three 14-Ton Oshkosh Earthmovers Model RXC. New England.
12-15 Yd.—Six 12-15 Yd. Federal Tractors and Fruehauf Semi-Trailers. Up-State New York.
16 Ton—Seven 16 Ton Diesel Euclid Bottom Dump Model 17FDT. New Jersey.
16 Ton—Six 16 Ton Diesel Euclid Bottom Dumps Model 6FDT. Florida.
16 Ton—Five 16-Ton Diesel Euclid Bottom Dumps Model 25FDT. Florida.
12 Yd.—One 12 Yd. A. C. Mack. New York City.
12 Yd.—Six 12 Yd. Titan Dump Trucks. Midwest.
12 Yd.—Four 12 Yd. Euclid Diesel Bottom Dumps Model FDT.
12 Yd.—Four 12 Yd. Euclid Bottom Dumps Model 12WCL. Florida.
12 Yd.—Two 12 Yd. Diesel Koehring Trail Dumps Model 120. Maryland.
12 Yd.—Five 12 Yd. International Rear Dumps Model K-10. Midwest.
14 Yd.—Four 14 Yd. Euclid Tuway Hydraulic Wagons Model 31 W. Maine.
11 Yd.—Two 11 Yd. Euclid Tuway Hydraulic Wagons Model 27W. Maine.
11 Yd.—Six 11 Yd. Sterling Rear End Dumps Model HCS210H.

ECONOMY COMPANY, INC.

49 Vanderbilt Ave., N. Y. C.

Tels. MUrray Hill 4-2294-8292-2295-2296

LOCOMOTIVES

Goodman: All 250 volts.
1—10 ton, 31 1-4-T.
1— 6 ton, 30B, 43" 1—5 ton.
1— 5 ton, W-1-2, 36".
2— 5 ton, 2600 K.
1— 6 ton, 33-1-4-T.
2— 8 ton, 32-1-4-T.

Westinghouse: All 250 volt.
1—4 ton, 902, 48"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.
Bar steel frames 10 ton, 6 ton, and 4 ton.

G.E.: All 250 volt. 4 ton 1022, 44" as is
6 ton 803, 44" as is 5 ton 825, 44" & 36"
6 ton 823, 44" 8 ton 839 motors
6 ton 801
8 ton 839
Battery Locomotives G.E., Ironton and Atlas.

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt.
1—**Jeffrey.** MH 100, frame only.

MINING MACHINES

Jeffrey. 35B and 4—28A, 250 V. 4—29B, 29C. 29CE with shearing head.
Revolving head for 29C.
Goodman. 12A, 12AB, 12AA, 12G3A, 24B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA.
2—124 E.J.
Motors for 212AA, both 250 and 500 volts.
Sullivan. CE7, CE9, CE10. CR10 Low Vein. CR5 for middle cutting.

SUBSTATIONS—275 volts, D. C.

2—200 KW **G.E.** Rotaries (600 volt).
2—150 KW **West.** Rotary.
1—200 KW 1—100 KW **Ridgway** M-G Sets.
2—100 KW **G.E.** Rotary.
1—100 KW **Allis-Chalmers** Rotary.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB, 12AA, 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V Bracket Type, 150 KW G. E. HCC Bracket Type, and 150 KW G. E., TC Pedestal Type.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Goose-neck). 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll) 12"x16", single roll 24"x36", 24"x24" * ROPE & BUTTON CONVEYOR 400' long * LATHES, SHAPERS * SWITCHES * AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps * MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps * HOISTS, overhead, AC 3-60-440, 1 ton and 2 ton * 1 clam shell bucket 1¾ cubic yard. 1—Figure 8 drum * MINE CARS * 2 SULLIVAN BIT SHARPENERS * R.R. SWITCHES 85# to 100# HOISTS 5 HP AC and DC GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also 50 KW 125 volt direct connected to steam engine.

GUYAN MACHINERY COMPANY, Logan, W. Va.

★ MINING EQUIPMENT READY FOR DELIVERY ★

GENERATORS

1—200-KW G.E. type TC-6 Rotary Converter complete with 6600/13200 volt Transformers switchboard equipment and extra armature.
1—100-KW. Westinghouse, type SK-180, 250 volt generator with switchboard.

CUTTING MACHINES

1—12-AA Goodman shortwall complete with truck, 250 volt.
1—CR-8 Sullivan shortwall, 250 volt.
4—35-L Jeffrey shortwalls, 220-440 volt A.C.
1—29-C Jeffrey Arcwall, 250 volt, top or bottom cutter.
1—28-A Jeffrey Shortwall, 250 volt.

LOCOMOTIVES

1—6-Ton Goodman, type 30-C, 42 or 44" gage, 250 volt, with cable reel.
1—5-Ton Goodman, Type 8-A, 250 volt, 48" gage, with cable reel.
1—8-Ton Westinghouse, Type 65, 44" gage, 250 volt.

MISCELLANEOUS

1—Sullivan bit sharpening machine with oil heating furnace.
1—18 x 18" Jeffrey single roll coal crusher.
1—Fig. 8 Incline rope drum complete for 1" rope.
1—5' x 8' Fairmont Vibrating Screen.
1—16" Steptoe shaper complete.
1—17" Smith & Miller Shaper complete.
1—2½' Canedy Otto Radial Drill press.
1—24" Rockford Upright Drill.

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ALL-STATE EQUIPMENT CO.
Logan, W. Va.

ROTARY CONVERTERS

500 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM. Pedestal Type, 2300/4000 V., Transformers.
300 KW G.E. SYN 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
150 KW G.E. SYN. 275 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V., Transformers.
150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM. Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

500 KW G.E. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM. Manual Switchgear.
200 KW G.E. Ind. 600 V.. 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM. Manual Switchgear.

LOCOMOTIVES

12-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 250 V., 906-C Mts., 36"-44" Ga.
8-T WESTGHSE., 500 V., 906-C Mts., 36"-42" Ga.
8-T GEN. ELEC., 250 V., 839 Mts., 36"-48" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

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"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M Since 1912 CINCINNATI 27, OHIO

TOP CUTTING MACHINE

1—Goodman type 724 E J 250 volt. 9 ft. Cutter Bar with two chains, adjustable from 35" to 77" cut.

JONES MINING EQUIPMENT CO.
Empire Bldg. Pittsburgh 22, Pa.

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for
HEAVY EQUIPMENT
CARS — CRANES — COMPRESSORS
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WE WELCOME YOUR INQUIRIES
WE WILL FIGURE WITH YOU ON YOUR SURPLUS

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and accessories
Immediate Shipment
MIDWEST STEEL CORPORATION
CHARLESTON WEST VIRGINIA

RAILS — CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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480 Lexington Ave. New York, N. Y. Reno, Nevada
810 Park Bldg. Fifth Avenue Pittsburgh, 22, Pa. Carnegie, Pa.

16 YD. DRAGLINE:
1—16 Yd. Electric Caterpillar Modern Dragline with 160' Boom.
AIR COMPRESSORS:
(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12") Belted 360, 676, 870, 1000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1,500, 2200, 2000, 5000 ft.
(14) Gasoline, 10, 160; 220, 210 & 370 ft.
RUBBER CONVEYOR BELTS:
1000' 60", 600' 30", 300' 20", 1000' 42", 900' 48", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14"
TANKS:
12,000 and 15,000 gal. and 20,000 gal.
CONVEYOR PARTS:
Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 in., 48 in. Large stock here.
STORAGE BATTERY LOCOMOTIVES:
2½ ton Whitcomb 24 ga. New Batteries
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.
DIESEL GENERATOR:
480 KW 3-60-2300 v. Cooper Bessemer
TROLLEY LOCOMOTIVES:
4—6 ton & 3—5 ton Goodman 36 ga.
3—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey
VIBRATING SCREENS:
9 Tyler Hummer 3x6, 4x5, 4x8, 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex
CARS:
60—Western 16-20-30 yd. Side Dump
30—50 ton Gondolas
12—50 ton Flat Cars
100—8000 & 10,000 gal. Tank Cars
SHOVELS, CRANES & DRAGLINES:
2 yd. Monighan 60' Boom Walker
2 yd. P. & H. Model 780 75' Boom Diesel Dragline
2—2¾ yd. 48B Diesel Shovel—Draglines
2 yd. Page 70' Boom Diesel Dragline
1¼ yd. Marion 450 Elec. Shovel
2—120B—4 yd. Elec. Shovel—Dragline
25 ton Browning 50' Boom Loco. Crane
MINE LOADERS:
H23 Sullivan Tunnel Loader
3—5 BU & 7 BU & 12 BU 36 or 42 ga. Joy
7 Conway 20A, 30A, 50A, 60 & 75 Muckers
5—Gardner Denver & Eimco Shovels
MISCELLANEOUS:
5'x60' Traylor Rotary Dryer
Clamshell Buckets ¾, 1, 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan St. Ga. Gas. Loco.
40 on Porter S.T. Locomotive
WANTED TO BUY:
Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers, Mine Loaders

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LATHES

36" x 24' American Grd. Hd. Two Carriages, Q.C.
24" x 16' LeBlond Screw Cutting Engine Lathe, Q.C.

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6' American Triple Purpose, M.D.
6' Cincinnati Bickord Radial M.D.
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5' American Triple Purpose Plain.

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STORAGE BATTERY

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1½ to 10 Ton 13" to 56" Track Gauge

GREENSBURG MACHINE CO.
Greensburg, Penna.

FOR SALE
150 KW
MOTOR GENERATOR SET
275/2300 volts with control
GEORGE M. MERIWETHER
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CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	20"	5	1/8"	1/32"
42"	5	1/8"	1/16"	20"	4	1/8"	1/32"
36"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	6	1/8"	1/16"	16"	4	1/8"	1/32"
30"	5	1/8"	1/16"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"
24"	4	1/8"	1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

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PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
3"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.
62-66 PARK PLACE NEW YORK, N. Y.

PIPE—MACHINERY—GAS ENGINES
AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
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PIPE New & Reconditioned

ALL SIZES for ALL PURPOSES
Cut and Threaded to Your Specifications
VALVES AND FITTINGS
UNITED PIPE & SUPPLY CO., NORRISTOWN, PA.

PROMPT SHIPMENT FROM OUR WAREHOUSE

MINING MACHINES

2—12 DA 50 HP 250 v. Goodman Shortwall
35 B Jeffrey 250 v. 6' cutter
12 G3 Goodman AC Shortwall, 220/3/60.

STORAGE BATTERY LOCOMOTIVES

2—6 Ton G.E. Permissible Locomotives 36/44" Ga. O.S. armorplate frame, inside steel tired wheels, 2-HM 825 Ball Bearing Motors, Type LSBE, Class 2C6 Form C9. 13½' long, 50" high, 69" wide and 44" Wheel base. Each of the above units equipped with Edison Battery 80 cell A-10—one new in 1940, the other in 1939.

1—5 to 5½ Ton Type D Ironton, 36 or 42" Ga. Low Type.
1—5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing Motors. Battery box on top of locomotive.
4 Ton 36" Ga. Atlas.
4 Ton 36" G.E. (2 motors).

(Haulage)

13 Ton Westgh. 250 V, 36" or 40" Ga.
13 Ton Westgh. 500 V. 40" Ga.
10 Ton Jeffrey 500 V. 36/42" Ga.
6 Ton Baldwin West. 250 v. 36/42" Ga. #48747 904 Motors outside bar steel frame, inside steel tired wheels.
2—6 Ton G.E. 500 v. 42/44" Ga.
2—6 Ton G.E. 250 v. 42/44" Ga.

SCREENS

2—4' x 5' single deck Tyler Hummer Screens, Type 37 equipped with V-16 Vibrators No. 2860 and 2867 designed for 110 v. AC 15 cy.

Rotary Con. & MG Sets (3 ph. 60 cy.)

2—300 KW G.E. HC 12 Rotary 275 v. 6 ph. with 2300 v. 3 ph. Trans.
150 KW G.E. RC Gen. 250/275 v. dir. con. 200 HP West. Syn. Motor 900 RPM.
75 KW G.E. 125 v.—125 HP G.E. JK 220/440 v.
75 KW 275 v. G.E.—125 HP Al. Ch. 220/440 v.

ENGINE GENERATOR & TURBINE SETS

65 HP Primm Oil Engine belted to AC or DC Gen.
57.5 KVA Allis Chalmers Gen. 220/3/60—Kerr Tur.
50 KW West. 125 v. DC—Skinner Engine.
50 KW 125 v. DC West. Turbo. Gen.

TRANSFORMERS

Qu.	KVA	Pri. V.	Sec. V.
31	7½	"	"
28	10	"	"
3	50	22000	2200
1	25 (1 ph.)	2200 v.	440/220
1	100 (3 ph.)	2200 v.	440/220

HOISTS

75 HP Lidgerwood sgl. fr. drum—AC or DC Motor
50 HP Thomas sgl. fr. drum—AC or DC Motor
30 HP Carlin double dr. fr.—AC or DC Motor

COAL CRUSHERS

18 x 24 and 18 x 30 New Scottdale dbl. roll.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
500	G.E.	450	S.R.	MT 412
300	West.	1750	S.R.	CW
200	G.E.	250	S.R.	MT 412
200	G.E.	600	S.R.	I-M
187	G.E.	600	S.R.	I-M
150	G.E.	600	S.C.	I-L
150	West.	375	S.R.	CW
150	West.	600	S.C.	CCL
150	West.	580	S.R.	CW
125	Al. Ch.	720	S.C.	
100	West.	1750	S.R.	CW
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	575	S.R.	
75	West.	900	S.C.	CS
50	G.E.	1200	S.C.	KT
40	Triumph	1800	S.C.	TR 11
25	West.	575	S.R.	CW

Other sizes down to 1 HP

DC Motors and Generators 230/250 V.

HP	Make	Speed	Wdg.	Type
175	G.E.	475	ser.	MD 109
150KW	Cr. Wh.	550	cp.	
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
100KW	G.E.	1200	cp.	RC
100	G.E.	950	cp. wd.	RC
75KW	G.E.	1200	cp.	RC
60	West.	1750	cp. wd.	SK
60	G.E.	600	ser.	CO 2507
60	Cr. Wh.	800	cp.	
50KW	Cr. Wh.	1050	cp.	

MOORHEAD-REITMEYER CO., INC. **Pittsburgh 19, Pennsylvania**

TROLLEY LOCOMOTIVES and ACCESSORIES

1—6-ton Jeffrey Mine Locomotive, armour plate frame, Serial No. 4949, drawbar pull 3,000#, speed 7 M.P.H., track gage 24", wheel location inside frame, wheelbase 40", overall length 149", width frame 44", height above rail 42", approx. weight 13,500#, 2—Type MH-88 motors, 250 volts, MB-16-H Jeffrey controller, equipped with General Electric trailing cable motor and complete equipment. **Price.....$2,000.00**

1—6-ton Jeffrey Mine Locomotive, reach gear construction, Serial No. 3300, drawbar pull 3,000#, speed 7 M.P.H., track gage 24", wheel location inside frame, wheelbase 40", overall length 150", width frame 43½", height above rail 50", approx. weight 14,000#, 2—Type MH-117 motors, 250 volts, MB-25-J Jeffrey controller, equipped with General Electric trailing cable motor and complete equipment, **Price.....$2,400.00**

1—6-ton Jeffrey Mine Locomotive, Serial No. 7275, drawbar pull 3,000#, speed 7 M.P.H., track gage 24", wheel location inside frame, wheelbase 40", overall length 140", width frame 46", height above rail 30", approx. weight 13,000#, 2—Type MH-88 motors, 250 volts, MB-25-J Jeffrey controller, equipped with General Electric trailing cable motor and complete equipment.
Price $3,000.00

1—6-ton Jeffrey Mine Locomotive, Serial No. 7619, drawbar pull, 3,000#, speed 7 M.P.H., track gage 24", wheel location inside frame, wheelbase 40", overall length 140", width frame 46", height above rail 30", approx. weight 13,000#, 2—Type MH-88 motors, 250 volts, 37-B Jeffrey controller, equipped with General Electric trailing cable motor and complete equipment. **Price..$3,000.00**

1—6-ton General Electric Mine Locomotive, Serial No. 10432, drawbar pull 3,000#, speed 7.5 M.P.H., track gage 24", wheel location inside frame, wheelbase 60", overall length 148", width frame 32½", height above rail 32½", approx. weight 13,000#, 2—Type HM 801 motors, 250 volts, B-62-A Gen'l. Electric controller, equipped with Gen'l. Electric trailing cable motor and complete equipment. **Price.....$3,000.00**

5—4-ton Jeffrey Mine Locomotives, Serial No. 4316, drawbar pull 2,000#, speed 7 M.P.H., track gage 24", wheel location inside frame, wheelbase 36", overall length 148", width frame 45½", height above rail 33", approx. weight 9,500#, 2—Type MH-96 motors, 250 volts, MB-24-D Jeffrey controller, equipped with Gen'l. Electric trailing cable motor and complete equipment.
Price..$2,000.00 each

All above locomotives are in good operating condition and are in operation at present. All are equipped with good headlights, steel tired wheels, trolley pole and wheel, interlocking automatic transfer switch for changing from pole to trailing cable. They are being offered for sale for reason of changing mine haulage from trolley to battery locomotive.

MOTOR GENERATOR SETS:

1—50 KW, No. 217500, 250 V., 200 amp. compound wound, 850 RPM **Westinghouse D.C. Generator,** direct connected to Gen'l. Electric 75 HP, 2200 V., 865 RPM, 19 amp. No. 1414622, Type KT 356, Form B Induction Motor. **Price....$800.00**

1—100 KW, No. 1714156, 250 V., 365 amp. Type SK compound wouad **Westinghouse** direct current **generator** built on common shaft with 150 HP., S#17155221, 2200 V., 31.8 amp., 900 RPM Westinghouse Synchronous Motor. Motor excitation from generator. **Price.....$2,000.00**

1—200 KW., No. 468125, Class 6 250 750, Type MPC, Form LO, 250 volts, 800 amps., 720 RPM **Gen'l. Electric** direct current **generator** direct connected to Crocker Wheeler synchronous motor No. 114271, Type 301S10, 290 HP., 2300 volts, 3 phase, 350 K.W., 87 amp., 720 RPM., .75 lead power factor, 60 cycle motor. Motor exciter on generator shaft extension, Gen'l. Electric continuous current generator No. 462404, Type K8 3, 24 amp., 125 volts. **Price.....$4,000.00**

New Parts and Cable Reel Equipment—approx. value **$6,000.00**

TENNESSEE COPPER CO.
61 Broadway, New York

FREIGHT CARS OF ALL KINDS!

14—Hopper, Twin, 50-Ton
50—Hopper, Side Discharge, 50-Ton
10—Refrigerator, 40-Ft., 40-Ton
10—Box, 40-Ft., 40-Ton
15—Box, Automobile, Steel, 50-Ft., 50-Ton
2—Dump, Western, Automatic, 30-Yd., 50-Ton; lift doors
2—Dump, Western, 20-Yd., 50-Ton; Steel Floors
4—Dump, K&J, Automatic, 37-Yd., 50-Ton; Lift Doors
12—Dump, K&J, Automatic, 20-Yd., 50-Ton; Lift Doors
5—Flat, 40-Ft., 50-Ton; AB Brakes
10—Tank, 8000-Gallon, 50-Ton Trucks
10—Tank, 10,000-Gallon, 50-Ton Trucks

All cars are priced to sell!

IRON AND STEEL PRODUCTS, INC.
40 years' experience
13484 S. Brainard Ave., Chicago, 33, Ill.
"ANYTHING containing IRON or STEEL"

LIQUIDATION!

We are liquidating six complete power plants just purchased from the Georgia Power Company, including:

22—High Pressure Water Tube Boilers, 200 to 600 H. P.
8—Turbo Generator Sets, condensing, from 275 to 2750 K.W.; all auxiliary equipment.

Above equipment operating as late as Dec. 1944

Republic Textile Equipment Company
40 Worth St. New York 13, N. Y.
Phone COrtlandt 7-1591

ELECTRIC LOCOMOTIVES

1—13 Ton GE with HM-829 motors.
1—13 Ton Jeffrey, 250 V, steel frame.
1—10 Ton GE steel frame, 250 V, HM-830-A motors.
1—6 Ton West, bar steel frame with 904-C, 250 V motors.
1—6 Ton Jeffrey, MH-88 motors, any gauge.
2—6 Ton GE with HM-823 motors.
1—5 Ton GE ready to operate, 42" ga.
2—5 Ton Goodman 250 V, 36" ga.
1—4 Ton Jeffrey MH-96 motors.

COAL CUTTING MACHINES

1—124EJ Goodman, 50 HP, 250 V, permissible track mounted slabbing machine.
1—35B Jeffrey 250 V shortwall.
1—35BB Jeffrey AC shortwall.
1—35B Jeffrey 500 V shortwall.
1—12DA Goodman, 50 HP, 250 V D.C.
1—12G3 Goodman, shortwall, 3/60/220 V, A.C.
1—12AB Goodman shortwall, 250 V, D.C.
1—36B Jeffrey, 250 V, 14" high.

MISCELLANEOUS

1—165 HP GE Syn. 2200 V, 900 RPM motor.
2—150 KW Syn. M-G Sets, 250 V.

Send us a list of any equipment you may have for sale.

TIPPINS MACHINERY CO.
Pittsburgh 13, Pennsylvania

MINING MACHINES

AC & DC

REBUILT & GUARANTEED FOR IMMEDIATE SHIPMENT

2-yd. Industrial Brownhoist Link-Type Coal Grab Bucket
Electric Coal Drills, Mine Fans, Pumps, Tipple Scales, etc.
2—Ironton 5-ton Storage Battery Locomotives

Equipment of all kinds
Buy, Sell or Exchange

THE INDUSTRIAL EQUIPMENT CORP.
705 First National Bank Bldg.
Pittsburgh 22, Pa.
Warehouse: Carnegie, Pa.

REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SET

1—200 kw. West. 600 v. DC 900 rpm Gen. direct. driven through common shaft by 1 - 290 HP 440 v. 3 ph 60 cy. West. Syn. Motor.

ROTARY CONVERTERS

3—150 kw. West. 3 ph. 60 cy. 275 v. 1200 rpm Rotary Converters comp. with transformers, switchboard.
3—300 kw. West. 3 ph. 60 cy. 600 v. 1200 rpm. Rotary Converters comp. with transformers, switchboard.

MINING MACHINES—250 v. DC

1—CE-7 Sullivan 36" ga.
1—Armature for CE-7 Sullivan 250 v. DC.

MINE LOCOMOTIVES

3—5 ton Goodman 30 B 250 v. 36" ga.
1—5 ton Goodman 2600R Gathering Locomotive, 250 v. DC 42 or 44" ga. with cable reel.
1—10 ton Goodman Haulage or Gathering Locomotive, 250 v. 42" ga. Inside wheels.
1—13 ton Westinghouse 42" ga. 250 v. Locomotive, two motor type; single end control.

PUMPS

1—American Piston Pump, intake 5½", discharge 4½", size 8x12.
1—90 GPM 225 ft. head, 600 rpm. 2"x2" Blackmer Pump.
1—220 GPM 225 ft. head, 600 rpm. 3½"x3" Blackmer Pump.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
300	G.E.	I	440	900
260	Burke	EMV-65	440	600
260	Burke	EMV-65	2200	600
150	West.	CW	220/440	490
100	West.	CW	220/440	685
50	Chand.		220/440	1800
50	Allis Chal.		220	490
30	West.	CI	220/440	860
30	West.	CI	220/440	787
30	West.	CW	220	900
30	West.	CW	220	1800
15	Westg.	CW	220	870

230 V. DC Motors

HP	Make	RPM	Type
1	Louis Allis	1150	INA
1½	Westg.	2200	SK
1½	Westg.	900	CD
1½	Robbins Myers	1750	
1½	Master	3450	DM
2	Thompson	1100	
2	Northern	1000	
2	Reliance	850	
3	G.E.	1700	RC-25
3	West.	860	CD
4	Cr. Wh.	1170	CM
5	Cr. Wh.	960	CCM
5	Cr. Wh.	980	CM
5	Imperial	540	SK
5	Westg.	850	
5	Westg.	1600	RC
7½	Cr. Wh.	875	
5	West.	1750	SK
10	Cr. Wh.	875	
10	Cr. Wh.	825	CM
10	Cr. Wh.	675	CCM
15	G.E.	850	RC
15½	West.	965	S
35	G.E.	900	DLC
75	West.	650	S

TRANSFORMERS—1 ph. 60 cy.

No.	Kva.	Pri.	Sec.	Make
1	2	6600	110/220	G.E.
3	5	2300	220/440	G.E.
1	5	2200	110/220	West.
84	7½	2200	220/110	G.E.
32	7½	2200	220/110	West.
12	10	2200	220/110	West.
13	10	2200	220/110	G.E.
2	15	400/30000/50000		American
2	15	2300	230/460	American
2	20	2300	230/460	American
1	20	2300	110/230	West.
2	25	2300	230/460	American
1	25	2200/1100	220/110	West.
1	25	2200	220/440	G.E.
6	35	220	110	West.
1	50	2200/110	220/110	West.
3	50	6600	575/440/220	G.E.
2	50	6600	550/440	Pgh.
2	50	6600	550/440	Al. Ch.
6	73	2200/4000	220/110	West.
6	73	440	205	West.
1	75	2200	220	Burke
6	75	2200	220/440	West.

AUTOMATIC RECLOSING CIRCUIT BREAKERS

1—300 Amp. 275 volts, type RBI, serial No. 6193.
1—400 Amp. 275 volt, type CRL, serial No. 6327.
1—400 Amp. 275 volt, type ARL, serial No. 7530.
1—600 Amp. Class I, type AHD, 275 v. Ser. No. 8051.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

MINE HOISTS

1—Wellman, Keyed Drum, 60" Dia. will coil 4500 ft. 1" rope. 200 or 300 H.P. Motor with Magnetic Control.

1—Vulcan, Shaft Hoist, 72" Dia. Suitable 300 ft. Shaft. Motor with control to suit requirements.

1—Nordberg, Shaft Hoist, 72" Dia. Suitable 200 ft. Shaft. 150 H.P. Motor with Control.

1—Vulcan, Cylindro-Conical, Shaft Hoist. Drum 7'-9' Dia. Suitable 350 ft. Shaft. 400 H.P. Motor with Control.

Other Hoists available to suit all mining conditions.

JONES MINING EQUIPMENT CO.
Empire Building Pittsburgh 22, Pa.

NEW DIESEL-GENERATORS
WE OWN AND CAN SHIP IMMEDIATELY

2—New Caterpillar D13000 diesel engines with electric starting equipment, direct connected to new 75 KW generators each with new 20 KW top mounted, belted generator, complete with instruments, batteries, spare parts, etc. No priority or release required.

L. B. SMITH, INC.
Camp Hill, Pa. Harrisburg 7331

B-Erie 50B steam 2-1/3 yd. shovel, 100% rebuilt.
Vulcan 18-ton steam S/T locomotive, 42" gauge.
Porter 18 ton & Vulcan 17 ton steam 36" gauge S/T locomotives, 100% rebuilt, tested.
Milwaukee 8 ton gas locomotive, 36" ga., rebuilt.
Whitcomb 8 ton gas locomotives (4), 24" gauge.
Steam locos., 58, 56, 50, 42, 40 tons, std. ga.
Marion electric 4 yd. & 3 yd. shovels.
Page 2 yd. Diesel dragline, 65' boom.
Euclid 6 yd. bottom dump crawler wagons (8).

H. Y. SMITH CO., Milwaukee 2, Wis.

FOR SALE

Electric Mine Hoist

60 HP motor, 220 volt, 60 cycle 3 phase, drum 36" x 36", flanges 6", rope speed 400 feet per minute, automatic brake. Priced for quick sale. Can be seen in operation at Cantrall Coal Co., located 8 miles north of Springfield, Illinois, on Route 29.

Mailing Address

CANTRALL COAL CO.
222 So. 6th St., Petersburg, Illinois

450 MINE CARS

Composite, electric welded, rotary dump type. Toncan steel, white oak bottom. Timken roller bearings, square alloy steel axles, 14" wheels. 4 wheel brakes. Gauge 44". Overall length 131", body 110", width 68", Wheelbase 36". Height above rail 42". Capacity 120 cu. ft. level. Swivel type hitchings.

These cars in service now, are offered subject to release August 1st, located within 20 miles Pittsburgh.

JONES MINING EQUIPMENT CO.
Empire Building, Pittsburgh 22, Pa.

2—Jeffrey 24 B—Longwall Machines 250 volts D.C.
2—Sullivan CR 2—Shortwall Machines 250 volts D.C.
10—Jeffrey 35 L—Shortwall 220/440 volts A.C.
1—Sullivan Air Compressor Class WL 44, 210 C.F.M.

BERRETTINI ELECTRIC CO.
378 N. Main St., Plains, Pa.

FOR SALE

BRADFORD COAL BREAKER

Nine-foot diameter, 11-foot long complete with countershaft. Rebuilt by manufacturer in January, 1945.

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FOR SALE

WIRE AND CABLE

1/0, 2/0, 4/0 insulated and bare, stranded and solid. Large assortment of other sizes available for immediate delivery.

GLAZER IRON & METAL CO.
520-610 Chamberlain St., Knoxville, Tenn.

REBUILT MINING EQUIPMENT

MOTOR GENERATOR SETS

1—100 Kw Ridgway Synch. Motor Generator Set 275 Volts DC. 3/60/2300 Volts AC, 1200 RPM with AC & DC Switchboards

JOHN D. CRAWBUCK CO. PGH. (12) PA.

FOR SALE

3—3-ton Mancha battery locomotives 36" gauge.
1—5-ton Atlas battery locomotive—36" gauge.
80—roller bearing 2-ton mine cars—36" gauge.

The American Fire Clay & Products Co.
2394 Canal Rd. Cleveland 13, Ohio

FOR SALE

1—New Fairbanks, Morse & Company built-in Mine Car Scale equipped with automatic Dial, Printomatic, and Electrical Control for motion weighting, purchased new 1943, has never been un-crated.

BEN HUR COAL CO.
Henryetta, Oklahoma

12x12 Deane Holyoke Vertical triplex single acting pump, brass fitted, steel split herringbone gears, 100 HP 230 volt, D.C. motor and starter. Completely overhauled and in first class condition.

American Well Works 5" 650 GPM pump 14 ft. T.P.H., with 5 H.P. 230 volt DC motor. In first class condition.

Cement gun complete with trucks, tank, 13x8 compressor, motor, etc.

ROBT. GAGE COAL CO.
Bay City, Mich.

FOR SALE

HOISTS

1—Shepard Niles Electric Hoist to raise loading boom conveyors, capacity 2000#, 5 HP, 3 ph, 60 cy, 440 volts, with controls.

1—Ottumwa electric hoist, single rigid cylindro-conical drum, with automatic control, Weight of cage 7000#, Weight of Car 2500#, Weight of Coal 6000#, Lift 310 ft., diameter of rope 1¼". Diameter of drum 60" x 84". Brake, 84" diameter, 8" face, post type, oil operated. Drum shaft bearings 10" x 20". Hoist is equipped with single reduction gears 19 and 229 teeth, 2½ D.P. 11" face. The drum has five grooves on the 60" diameter, 11 grooves up the cone, 4 grooves on the 84" diameter. The drum has a rope capacity of 326 feet plus three dead turns. The hoist is equipped with a 200 HP motor.

1—Ottumwa Electric hoist, single rigid conical drum type, with single reduction herringbone gear, the pinion running between two bearings and connected with motor by flexible coupling. Weight of coal 4000#, Weight of car 1800#, Weight of cage 4000#, total cage travel 210 ft, size of rope 1⅛". End lift. The hoist is equipped with a 150 HP motor.

MINING MACHINES

4—Goodman Universal Shortwall mining machines, 112AA, 6 ft. cutter bars, 50 HP motors, DC, 250 volts, 36" or 42" gauge.

1—Goodman Universal Shortwall mining machine, 112DB, DC, 250 volts, Cincinnati Duplex chain, 6 ft. cutter bar. Has new extra armature. 36" or 42" gauge.

6—Goodman Standard Shortwall mining machines, 12AA, 250 volts, DC, 6 ft. cutter bars, 36" or 42" gauge.

3—Goodman Longwall mining machines, DC, 36" or 42" gauge.

7—Jeffrey 35A Shortwall mining machines, 50 HP motors, 250 volts, DC, 6 ft. cutter bars, 36" or 42" gauge.

3—Sullivan CE-7 Shearing machines, 250 volts, DC, 7 ft. cutter bars, 36" or 42" gauge.

1—Sullivan CE-7 Shearing machine, AC, 220 volts, 3 ph, 60 cy, 7 ft. cutter bars, 36" or 42" gauge.

1—Sullivan CE-7 Shortwall mining machine, AC, 220 volts, 3 ph, 60 cy, tip-turn truck, 7 ft. cutter bar, 36" or 42" gauge.

LOCOMOTIVES

3—Goodman 5 ton locomotives, type WI-2A5, 36" or 42" gauge. One is complete with electric reel.

2—Goodman 6 ton ball bearing locomotives, type 3314T, 36" or 42" gauge.

1—General Electric Co. 8 ton ball bearing locomotive, HM-839A motors, 36" or 42" gauge.

1—Westinghouse 8 ton locomotive, cast iron frame, 36" or 42" gauge.

1—Jeffrey 5 ton locomotive, cast iron frame, 36" or 42" gauge.

CRUSHERS

2—Jeffrey Crushers, single roll, size 30 x 30.

AERIAL TRAM

1—B & D, 60 cubic feet automatic dump bucket aerial tram with 1200 feet of 2" interlocking cable and drive.

PIT CARS

120—Timken roller bearing cars, 8' overall length, bumper to bumper, 4'3" overall width, 2'5" overall height, 18½" wheelbase. End dump. One link and pin, 36" gauge.

CENTRIFUGAL PUMP

1—Platt Centrifugal pump, size 5, 4 stage, 500GPM, 358' head, 1720 rpm, direct connected to a General Electric 100HP, slip ring motor, #663889, type 1-4-100-1800, Form M, 60 cycle, 3 phase, 24 amps, secondary amps 98, volts 2200, speed no load 1800, speed full load 1710.

CONVEYORS

6—Goodman shaker conveyors, type E, complete with pans.

STEEL TIPPLES

1—Tipple and shaker constructed by Allen and Garcia Company. Capacity 3000 tons daily.

2—Tipples—smaller capacity than the one listed above.

Have new and second hand rails and track accessories.

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FOR SALE—IMMEDIATE DELIVERY

1—Llewellyn automatic coal washing unit, double stage, single unit, 45 tons per hour capacity, built by the Pittsburgh Coal Washer Company, consisting of—

1—Coal washer unit complete with circulating water pump, chain and flight type conveyors

1—Shaker screen 36' long by 6' wide made in two 18' sections with screens for 2½" & ½" size coal, shaker screens spring board mounted and operated through four eccentric drives having 1" stroke, capacity 46 tons per hour

1—Raw coal and middlings conveyor, chain and flight type 20' long

1—Refuse bin conveyor 10' long, 5 tons per hour

1—Slack by-pass conveyor 28' long 200' per minute, 79 tons per hour

1—Clean coal conveyor 18' long

1—Refuse hopper 9' x 9' x 3' 6" deep

The above equipment complete with 440 volt, 3 phase, 60 cycle motors, Foote Bros. speed reducers, controls, complete wiring and texrope drives housed in a two story two room structural steel building 32'4" x 46'4" x 25'2" height, exterior walls and roof of galvanized corrugated iron, steel doors and windows and electric lighting.

Included in addition is a considerable amount of new repair parts for Washer unit, speed reducers, eccentric drives and conveyors.

Plant located near Saxton, Bedford County, Pa.

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Lima 101 Shovel-Crane 1¼ yd. Rebuilt
Lorain Model 60 Shovel, 1 yd. Rebuilt
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P & H 700 Shovel 1½ yd.
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P.&H. 600 Shovel and Crane, ½ yd.
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Marion 371, 1¾ yard Shovel-Crane-Dragline
P & H 650 Shovel and Crane
Buc. Erie GA-2 Shovel, gas
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Air Compr's. elec. 400, 500, 800, 1051, 1300, 2000 ft.
Allis-Chalmers Model "L" tractor with Bulldozer
Caterpillar 40 Diesel with LaPlant-Choate Bulldozer
Jaw Crushers: 12x26, 13x30, 14x28, 16x32
Robbins double roll coal crusher 24"x30"
Mundy 35 H.P. double drum gas Hoist
National 100 H.P. dbl. drum Dragline Hoist, elec.
Baldwin 78 ton Side Tank Locomotive
American 45 ton Saddle Tank Switcher
Vulcan 30 ton Steam, std. gauge Saddle Tank loco.
Vulcan 25 ton Steam Loco. std. ga. side tank
Whitcomb 14 ton 36" gauge Diesel Loco.
Vulcan 6 ton, 36" gauge, gas Locomotive
15—Gondola Cars, 50 tons, steel
Trucks: Mack, Sterling, G.M.C. up to 12 yds.
Pumps—Gas, Electric, Steam, large stock
Air compressors from 300 to 2000 cu. ft.
Bucket elevator, belt, 22" buckets, 35'
Haiss ¾ yd. Clam. rehandling Bucket
Erie ¾ yd. Clam. rehandling Bucket
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HAZLETON, PA. PHONE 3906

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8—HOISTS 250 V. D.C. MOTORS

2—Vulcan 48 inch Drum Hoist 125 HP
1—Vulcan 32 inch Drum Hoist 50 HP
1—Vulcan 28 inch Drum Hoist 35 HP
1—Vulcan 18 inch Drum Hoist 25 HP Motor
1—Vulcan 27 inch Drum Hoist 50 HP
2—Vulcan 24 inch Drum Hoist 35 HP

6—Sullivan CE-7 Cutting Machines 250 Volt
250—Rebuilt 2¼ Ton Card Iron Works Mine Cars Timpkin Bearing Equipped, 36" ga.
50—C.S. Card style 372 Sheaves, Complete

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Denver 2, Colorado

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1—Marquette Arc Welder, 220 Volt A.C. 60 Cycle 0 to 250 Amp Welding Range. Good Condition.

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5—#60 Conway Mucking Shovels, 36" gauge, dipper capacity 13½ cu. ft. with 60 H. P. U. S. motors, 3/60/440
2—#2 Hoar Mucking Shovels, 36" gauge, air operated, 90 lb. air pressure.
Butler Model #110 Shovel Loader, 36" gauge

LOCOMOTIVES

6—10 Ton Baldwin Westinghouse, Storage Battery Locomotives, draw bar pull 2000 lbs., 36" gauge.
3—6 Ton Whitcomb Storage Battery Locomotives, draw bar pull 1000 lbs. type ESB, 36" gauge.
3—6 Ton General Electric Storage Battery Locomotives, type MBA, Draw bar pull 1000 lbs., 36" gauge.

FREQUENCY CHANGERS

2—200 KW General Electric Frequency Changers, Comprising 290 H.P. G. E. syn. motors, type ATB, 3/25/2300, direct connected to G. E. A. C. Generators, type ATB, 440 volt, 750 RPM, complete with starting equipment and compensator.

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3—Connersville Rotary Positive Blowers, 14.2, 16.2 and 33 cu. ft. per revolution
3—Nash Hytor Blowers or Compressors, 450 c.f.m. 12 lb. pressure.
2—G. E. Centrifugal Blowers, 7500 c.f.m. 2 lb. pressure with A. C. motors
General Centrifugal Blower, 4000 c.f.m. 14 oz. pressure with 30 H. P. Motor.
Mahr Exhausting Blower, 3000 c.f.m. 14 oz. pressure with 25 H. P. G. E. motor.

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Ingersoll Rand Steel Sharpeners, Model 50 with 1⅛" and 1¼" dies, complete with Dollies and punching attachments.

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27 KW, General Electric Generator, type CD93, 125 volt, 216 Amp., direct connected to 40 H. P. G. E. motor, 3/60/440, with 2-battery charging panel, automatic.

HOISTS

Ottumwa Single Drum Mine Hoist, 48"x48" with post-brake, driven by 200 H. P. slip ring motor, complete with Pacific speed reducer and starting equipment
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Also, Novo, C H & E, Ersted Single Drum Hoists, 1000 and 3000 lb. line pull
2—Lidgerwood Drag Line Hoists

PUMPS

2—6" Moretrench Wellpoint Pumps with 4 cyl. gasoline engines.
2—Morstrench 3x4 Jetwell Pump, with 6 cyl. gasoline engine
2—Byron Jackson 4-stage, Deepwell Submersible Pumps with 75 and 85 H.P. A.C. motors.
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1—300 Amp. Hanson Fusion Welder, with A. C. motor.
1—200 Amp. Lincoln Welder with 10 H. P. A. C. motor.

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LOCOMOTIVE STEAM CRANES

Weighing 40 and 65 tons, with 45' and 50' booms, operating on standard gauge track. Located in the Boston region.

For complete description, conditions and terms of sale, communicate with the RFC Disposing Agency in the city nearest you. Ask for "Special Railroad Transportation Equipment List DPC No. 1."

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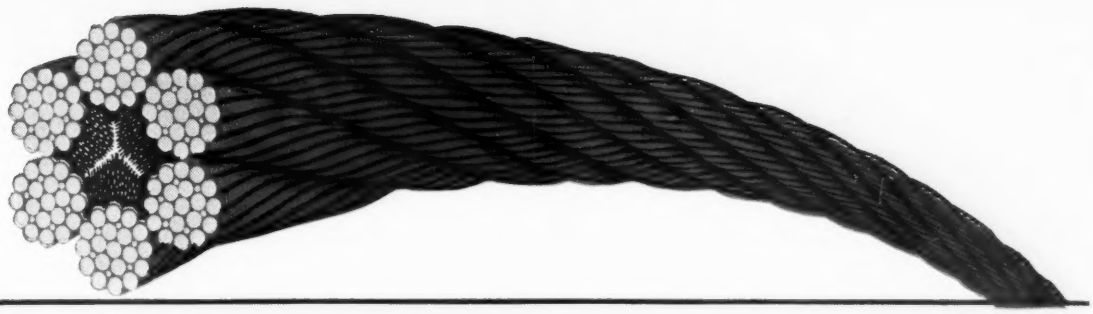

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